INTERNATIONAL AMATEUR RADIO UNION REGION 1

VHF MANAGERS HANDBOOK

2011, IARU Region 1, CH-6330 CHAM ZG, Switzerland

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Vienna, December 2011

Dear YL and OM,

This PDF file contains the text of the IARU Region 1 VHF Managers' Handbook, Version 5.50

All relevant decisions of the 2011 general conference Sun City (South Africa) have been taken into account. Also the address lists and the records table have been updated.

Addresses will generally be updated once the information has been received.

73 de Michael Kastelic, OE1MCU

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LIST OF CHANGES

Version 5.35

- Update VHF manager list
- Resolutions of the General Conference 2008 in Cavtat was incorporated
- Contest Section complete overworked
- 3.2.5 174 – 230 MHz removed
- 2.2.7 890 – 942 MHz removed
- 7.9 Definition of a complete contact (removed)
- 2. Recommendations - added
- 7.5 QSO Procedure for Airplane Reflections - added

Version 5.40

- Update VHF manager list
- Minor errors fixed
- Old ITU tables removed

Version 5.41 – 5.43

- Update VHF manager list
- Minor errors fixed (typing and references)
- BEACON MESSAGE (11.1.5 - Vienna 2010)
- TONE REPORTS (8.8.7 – Vienna 2010)
- 50 - 52 MHz BANDPLAN Usage (4.2) Vienna 2010
- Contacts (5.3.6) Vienna 2010
- Added: LOGBOOK PROGRAMS SUPORRTING EDI (5.9)
- Updated PROCEDURE FOR ORGANISING IARU REGION CONTESTS (5.2)
- Satellite

Version 6.00 (decisions from Sun City added)

- Update VHF manager list
- Minor errors fixed
- IARU Region 1 band planning: Principles – Repeater coordination added (3.1.2)
- CTCS frequency added (8.8.4)
- FREQUENCY SPACING updated (11.1.4)
- BEACON MESSAGE updated (11.1.5)
- extra guidance for beacons added (11.1.6)
- 67Hz added to the Table FM.2.1.
- Update Text CTCSS (8.8.4)
- All bandplans up to 78Hz modified to 4 columns (frequency / maximum bandwidth / mode / usage)
- 50-52 MHz Bandplan Updated (4.2)
- 70-70,5 MHz Bandplan Updated (4.3)
- 144 - 146 MHz Bandplan - Repeater segment extended (4.4)
- 1250 MHz Bandplan updated (4.6)
- 2320 MHz Bandplan updated (4.7)
- 3400 MHZ Bandplan updated (4.8)
- 134 - 141 GHz Bandplan Updated (4.13)
- ATV contest updated (5.7.1)
- Contest judging of entries updated (5.3.11)
- Additional contest Segment 144,500 – 144,700 MHz added (5.3.3)
- Multiplier updated (5.3.9)
- Complete new Amateur Satellite chapter (9) - (thanks to Graham Sirville, G3VZV)

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 IARU Region 1 conferences

1950 Paris
1953 Lausanne
1956 Stresa
1958 Bad Godesberg
1960 Folkestone
1963 Malmo
1966 Opatija
1969 Brussels
1972 Scheveningen
1975 Warsaw
1978 Miskolc Tapolca
1981 Brighton
1984 Cefalu
1987 Noordwijkerhout
1990 Torremolinos
1993 De Haan
1996 Tel Aviv
1999 Lillehammer
2002 San Marino
2005 Davos
2008 Cavtat
2011 Sun City

1.3 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 society [1].

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

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

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

[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.

1.4 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, Hans Blondeel Timmerman, PB2T.

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

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

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

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

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

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

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

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

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

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

- As a few authorities in the European part of Region I have allowed some amateur activity in the 50 MHz part of the spectrum, societies are urged to again approach their P & T authorities with the aim of obtaining an allocation or assignment preferably between 50 and 55 MHz. In view of the TV activity still present in this part of the spectrum, in the first instance permission may be sought for operation outside TV broadcast hours, e.g. for experimental purposes for a selected number of stations.

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

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

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

- IARU and IARU Region 1 should maintain their basic policy of trying to retain all wideband secondary allocations in the Microwave bands.

- Note. This IARU policy is clearly set out in paper C3.35, submitted to the IARU Region 1 Conference at De Haan (1993) by the International Secretariat of IARU. At this Conference the paper (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 vigourous efforts - via approaches by member societies to Administrations, as well as indirect approaches to, for instance, the CEPT - to get a reasonable and common part of this frequency segment de facto or de jure exclusively allocated to the Amateur Service.

Within CEPT an large programme has been initiated from 1993 onwards to create a harmonised European frequency table. Detailed Spectrum Investigations (DSI) have been arranged and IARU Region 1 and its member societies have actively contributed to those studies. In the microwave bands this has led to retention of the existing allocations in the ITU table and in addition to a recommmendation that administrations should allocate spectrum in the 3400-3500 MHz band to their amateurs. Moreover the concept of virtually exclusive narrow segments in the microwave bands has been recognised by the CEPT.
Currently amateurs in 4X, 5B, 9A, OH, OK, OZ and PA have got access to 3400-3410 MHz in addition to the (ITU footnote) allocations in Bulgaria, Norway, Poland, Germany, Slovenia 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 committe meeting in Vienmna 1995 the thread to the 435 MHz band was taken seriously and all member societies in the CEPT countries were urged to lobby for retention of the "full allocation".

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

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

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

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

1.4.1 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.

1.5 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 1.11

1.6 Coordinators of the VHF/UHF/Microwaves Committee

1.6.1 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 If of this handbook.

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

> It is intended that copies of the results of the survey of Region 1 VHF/UHF/Microwaves frequency allocations be supplied to Regions 2 and 3 of IARU with a request for similar

information, so that world-wide co-ordination can be obtained, especially with regard to satellite and EME communication.

The Plenary Session agreed with this suggestion, stipulating that this should be done via the IARU Region 1 Secretariat.

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

> Member societies should work to establish and/or maintain common frequency allocations for the Amateur Service and the Amateur Satellite Service to enable international working and facilitate 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).

1.6.2 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)

1.6.3 PROPAGATION COORDINATORS

a. **Ionospheric Propagation Coordinator**
t.b.f.

b. **Auroral Propagation Coordinator**
t.b.f.

c. **Tropospheric Propagation coordinator**
t.b.f.

1.6.4 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

1.7 IARU REGION 1 EXECUTIVE COMMITTEE

For actual contact information please visit: http://www.iaru-r1.org
(About IARU Region 1 -> Executive Committee)

1.8 CHAIRMEN OF PERMANENT COMMITTEES IARU R1 COORDINATORS

For actual contact information please visit: www.iaru-r1.org

1.9 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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X	VHF/UHF/Microwave Records Keeper	Tommy Bjornstrom,SM6NZB Doktor Sydowsgata 32 SE-413 24 Gothenburg Sweden	sm6nzb@ssa.se tel : +46 31 741 2572
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Former Chairman	Arie Dogterom, PAoEZ (1993 - 2005) Kees van Dijk PA0QC (sk) (1967 -1993)		
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1.11 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.

2 RECOMMENDATIONS

2.1 Proper use of amateur frequencies (Cavtat 2008)

Member Societies are recommended to promote the proper use of amateur frequencies consistent with the international Radio Regulations, with a view toward maintaining the integrity of the amateur service and its frequency allocations as well as promoting the success of amateur satellite activities in their country.

2.2 Satellite frequency coordination (Cavtat 2008)

Member Societies are recommended to work closely with the IARU Satellite Adviser and his Advisory Panel, and with their national administrations, with respect to requests for satellite frequency coordination originating in their respective countries,

2.3 145MHz for satellite downlinks (Cavtat 2008)

The presence of interfering non-amateur signals in the 145.80-146.00MHz part of this band, in many parts of the world, is well documented. To prevent the retransmission of interfering terrestrial signals, satellites in the Amateur Satellite Service that plan to use the 145MHz Amateur band for transponders, are encouraged to use this band for downlink (satellite to ground) modes only, regardless of modulation type.

2.4 Multi-Band beacon clusters (Cavtat 2008)

- National Societies should encourage the deployment of multi-band beacon clusters covering low VHF between about 30 MHz and about 70 MHz.
- Deployed beacon clusters should wherever possible provide signals at around 40 MHz and around 60 MHz.
- Amateurs should be encouraged to set up and maintain automated monitoring stations and to contribute the measurement results to the community.
- A common transmission format should be adopted to aid the reception of multiple clusters

2.5 3400-3410MHz allocation

- National Societies should take all necessary steps in seeking 3400-3410MHz allocations on a Secondary non-interference basis as quickly as possible.
- All Societies should explicitly include the Amateur Satellite Service (both SAT-Earth and Earth-SAT) in such requests on the basis that many years of terrestrial and EME operations (notably in the CEPT area) have not resulted in interference reports from other users.
- National Societies and IARU–R1 should collaborate more closely to assist those Societies who in the past have not been able to achieve such allocations.
- Societies should collectively obtain a critical mass of national allocations so that footnotes in regional allocation tables can be extended or acquired that include the Amateur Satellite Service
- IARU-R1 to prioritise this band and to take active steps in support of these goals

2.6 Contest Log exchange

National VHF Managers or properly nominated Contest Committees should send the electronic contest log data entries from IARU R1 contests to a special web page to allow an exchange of logs for more accurate national evaluation.

3 FREQUENCY ALLOCATIONS, BANDPLANNING

3.1 INTRODUCTION TO VHF/UHF/Microwaves BANDS AND BANDPLANS

3.1.1 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 WARCs 1979 and maintained at the WARC 1991 (Torremolinos), 2000 (Istanbul) and 2003 (Geneva), 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).

3.1.2 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.

Coordination process:
Repeater frequency allocations in neighbouring countries within Region I should be coordinated in case their coverage pattern would overlap the border (see section 9).

1. Coordination with the national society first.
2. For cross-border disputes to co-ordinate with the neighbouring societies relevant coordinators.
3. In the event of escalating to the national regulator that all the affected societies to be informed. This should only be the last resort if steps one and two fail.

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.

3.1.3 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.

3.2 ITU regulations

ITU Website: www.itu.int

Please contact the Chairman of the VHF/UHF/MW Committee for a copy

4 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 FM 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	
75.500	-	76.000	GHz	(DAVOS 2005)
77.500	-	77.501	GHz	
122.250	-	122.251	GHz	
134.000	-	134.001	GHz	
248.000	-	248.001	GHz	

note : As it cannot be expected that FM 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"

4.1 CHANNEL DESIGNATION SYSTEM FOR VHF/UHF FM CHANNELS

Although the FM channels can be referenced by their centre frequency, a numbering/naming system for FM 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 F00 for 51.000 MHz and increment by one for each 10 kHz.

5) In the 145 Mhz band the channel numbers start at V00 for 145.000 MHz and increment by one for each 12.5 kHz.

6) In the 435 MHz band the channel numbers start at U000 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 FM channels are defined below 51 MHz. (See also footnote e to the 50 MHz bandplan.
In the 145 MHz band FM 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 FM channels are defined in the segment 432.000 MHz -- 433.000 MHz

4.2 50 - 52 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
50.000 50.100	500 Hz	Telegraphy exclusive (except Beacon Project)	50.000 - 010 Region-1 * 50.010 - 020 Region-2 * 50.020 - 030 Region-3 * * Reserved for future Synchronised Beacon Project (b) 50.050 CW future International centre of activity 50.090 CW Intercontinental centre of activity
50.100 50.200	2700 Hz	SSB Telegraphy	International preferred 50.100 - 130 Intercontinental section 50.110 Intercontinental centre of activity(**c**) 50.130 - 200 international section 50.150 International centre of activity
50.200 50.300	2700 Hz	SSB Telegraphy	General usage 50.285 for crossband
50.300 50.400	2700 Hz	MGM Narrowband Telegraphy	50.305 PSK Centre of activity 50.310 - 320 EME centre of activity 50.320 - 380 MS centre of activity
50400 50.500	1000 Hz	MGM Telegraphy	Beacons exclusive 50.401 MHz +/- 500 Hz WSPR Beacons
50.500 52.000	12 kHz	All Modes	50.510 SSTV 50.540 - 580 Simplex FM Internet Voice Gateways 50.550 Image frequency 50.600 RTTY 50.620 - 750 Digital communications 50.630 DV calling 51.210 - 390 FM/DV Repeater Inputs, 20 kHz spacing (**e**) 51.410 - 590 FM/DV Simplex (**f**) 51.510 FM calling frequency 51.810 – 990 FM repeaters output channels, 20 kHz spacing (**e**)

DV = Digital Voice

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, the 2002 San Marino Conference, and the 2011 Sun City 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. These Countries may refer to the SARL Bandplan.

Footnotes:

a. deleted

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

b. 50.0-50.1MHz is currently shared with Propagation Beacons. These are due to be migrated by August-2014 to 50.4-50.5 MHz, to create more space for Telegraphy and a new Synchronised Beacon Project

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 FM channel spacing is 20/10 kHz.

e. For the specification of FM telephony see section 8.2

f. This segment is for simplex use only with no Digital Voice gateways permitted. Embedded data traffic is allowed along with Digital Voice. DV users should check that the channel is not in use by other modes

g. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band

For the numbering of FM telephony channels see 4.1

In those countries within the European part of IARU Region 1 where it is allowed to set up FM 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)

4.3 70.0 - 70.5 MHz BANDPLAN

Frequency (MHz)	maximum Bandwidth	MODE	Usage
70.000 **70.090**	1000Hz	TELEGRAPHY MGM	Coordinated Beacons
70.090 **70.100**	1000Hz	BEACONS	temporary and personal beacons 70.090 Personal WSPR beacons
70.100 **70.250**	2700Hz	TELEGRAPHY SSB MGM	70.185 Crossband center of activity 70.200 Telegraphy/SSB calling 70.250 MS calling
70.250 **70.294**	12kHz	AM / FM a)	70.260 AM/FM calling 70.270 MGM centre of activity
70.294 **70.500**	12kHz	FM CHANNELS, 12.5 kHz spacing	70.3000 RTTY/FAX 70.3125 Digital communications 70.3250 Digital communications 70.4500 FM calling 70.4625 70.4750 70.4875 Digital communications

The 70MHz band is increasingly recognised as being appropriate for amateur allocations. In the CEPT area this progress is now recognised in the European Common Allocation table by footnote EU9 which states:

EU9: "In a growing number of CEPT countries, parts of the band 70.0---70.5 MHz is also allocated to the Amateur service on a secondary basis."

In addition it is worth noting that there is some experimental access on a national basis in the range 69.90 - 70.0MHz in cases where 70MHz is not available.

NOTES ON THE 70 MHz BANDPLAN

a) Refer to Beacons Chapter for coordination of beacons Section 11
b) Usage by operators may vary due to restrictions on national allocations

4.4 144 - 146 MHz BANDPLAN

Frequency (MHz)	Maximum Bandwidth (-6dB)	MODE	USAGE
144.000 **144.110**	**500Hz**	**Telegraphy(a)** **EME**	144.050 Telegraphy calling 144.100 Random MS(**m**)
144.110 **144.150**	**500Hz**	**Telegraphy** **MGM**	144.110–144.160 EME MGM 144.138 PSK31 center of activity
144.150 **144.180**	**2700Hz**	**Telegraphy, SSB, MGM**	144.160.144.180 alternative MGM allocation 144.170 alternative MGM calling frequency
144.180 **144.360**	**2700Hz**	**Telegraphy & SSB**	144.195-144.205 Random MS SSB (**m**) 144.300 SSB calling
144.360 **144.399**	**2700Hz**	**Telegraphy, SSB, MGM**	144.370 FSK441 Random calling(**m**)
144.400 **144.491**	**500Hz**	**Telegraphy** **MGM**	Beacons exclusive(**b**) 144.4905 +/-500Hz WSPR Beacons
144.500 **144.794**	**20kHz**	**All mode (f)**	144.500 SSTV calling 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 144.750 ATV talk back
144.794 **144.9625**	**12kHz**	**MGM (h)**	144.800 APRS

144.975 145.194	12kHz	FM / Digital voice	Repeater Input exclusive (**c**)
145194 145.206	12kHz	FM / Digital voice (i)	Space communication (**p**)
145.206 145.5625	12kHz	FM / Digital voice (i)	145.2375 FM Internet Voice Gateway 145.2875 FM Internet Voice Gateways 145.300 RTTY local 145.3375 FM Internet Voice Gateway 145.375 digital voice calling 145.500 (mobile) calling
145,5750 145.7935	12kHz	FM / Digital voice	Repeater Output exclusive (**c**,**d**)
145.794 145.806	12kHz	FM / Digital voice (i)	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.

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. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11

c. For technical standards on FM and repeaters see section 8

If there is a real need for more repeater channels (see section10), 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 FM channels in order to effectively implement the 12.5 kHz system .

For the numbering of FM 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).

i. This segment is for simplex use only with no Digital Voice gateways. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by FM

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.

EME activity using MGM is commonly practised between 144.110-144.160MHz

2.1. Footnotes

m. See procedures set out in section 7.4

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 FM 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)

4.5 430 - 440 MHz BANDPLAN

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
430.000 SUB-REGIONAL (national bandplanning) (**d**) **431.975**	20kHz	ALL MODES	430.025 - 430.375 430.400 - 430.575 430.600 - 430.925 430.925 - 431.025 431.050 - 431.825 431.625 - 431.975	FM repeater output-channel freqs (F/PA/ON),12,5 kHz spacing, 1.6 MHz shift (f) Digital communication link channels (g) (j) Digital communications repeater channels (g) (j) (**l**) Multi mode channels (j) (k) (**l**) Repeater input channel freqs (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift (f) Repeater input channel freqs (F/PA/ON), 12.5 kHz spacing, 1.6 MHz shift
432.000 **432.025**	500Hz	Telegraphy (**a**)		EME
432.025 **432.100**	500Hz	Telegraphy (**a**) MGM	432.050 432.088	Telegraphy centre of activity PSK31 centre of activity
432.100 **432.400**	2700Hz	Telegraphy SSB MGM	432.200 432.350 432.370	SSB centre of activity Microwave talkback centre of activity FSK441 random calling
432.400 **432.490**	500Hz	Telegraphy, MGM		Beacons exclusive (**b**)

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
432.500 **432.975**	 12kHz	 ALL MODES	432.500 432.500-432.600 432.600 432.700 432.600-432.800	NEW APRS FREQUENCY LINEAR TRANSPONDER IN(**e**) RTTY (ASK/PSK) FAX (ASK) LINEAR TRANSPONDER OUT (**e**) REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 2 MHz shift (Channel freq 432.600 - 432.975MHz) In the UK repeater OUTPUT channels.
433.000 **433.375**	12 kHz	FM **Digital voice** Repeater (p)		REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 1.6 MHz shift (Channel freq 433.000--433.375 MHz) I
433.400 **433.575**	12 kHz	 **FM** **Digital voice** **(f) (o)**	433.400 433.450 433.500	SSTV(FM/AFSK) digital voice calling (Mobile) FM calling SIMPLEX CHANNELS, 25 kHz spacing, (Channel freq 433.400 – 433.575 MHz)
433.600 **434.000**	 20kHz	 ALL MODES	433.600 433.625 - 433.775 433.700 434.000	RTTY (AFSK/FM) Digital communications channels (**g**) (**h**) (**i**) FAX channel (FM/AFSK) Centre frequency of digital experiments as defined on note **(m)**
434.400 434.594	12kHz (c)	ALL MODES ATV (c)	434.450 - 434.575	Digital communications channels (by exception !!) (**i**)

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
434.594 ATV (**c**) & FM **434.981**	12kHz (c)	ALL MODES		REPEATER OUTPUT (region 1 system), 25 kHz spacing, 1.6 MHz shift, (Channel freq 434.600 -- 434.975 MHz) In the UK repeater INPUT channels
435.000 **438.000**	20kHz (c)	Satellite service & ATV (**c**)		
438.000 ATV (**c**) & SUB-REGIONAL (national bandplanning) (**d**) **440.000**	20kHz (c)	ALL MODES	438.025 - 438.175 438.200 - 438.525 438.550 - 438.625 438.650 - 439.425 439.800 -- 439.975 439,9875	Digital communications channel frequency (**g**) Digital communications repeater channels (**g**) (**j**) (**l**) Multi-mode (**j**) (**k**) (**l**) Repeater output channels (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift, (**f**) **(p)** Digital communications link channels (**g**) (**j**) POCSAG centre

NOTES ON THE 430 - 440 MHz BANDPLAN

1.IARU REGION 1 430-440MHz 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 are between 432.000 and 432.600 MHz)

iii. FM telephony channels and Repeaters are specified in chapter 8.8.4

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. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band
See Section **Fehler! Verweisquelle konnte nicht gefunden werden.**

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.

f). This segment is for simplex use only with no Digital Voice gateways. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by other modes

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. 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 FM telephony channels see 4.1

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 nor interfere with linear transponders.

3. Modulation techniques requiring a channel separation exceeding 25 kHz must not be used on these channels. (De Haan, 1993)

j. At the IARU Region 1 Conference in Torremolinos (1990) the following recommendation was adopted regarding the segments for repeaters and links, shown in footnote g:

For a repeater/link to be installed within 150 km of a national border, the member society should co-ordinate the frequency allocation and the technical (system) data with the member societies in neighbouring countries. Special attention should be paid to the common good practice of using directional antennas and the minimum power necessary.

As a matter of course this agreement is also valid for any link experiments carried out on the multi-mode channels in the segment 438.544--438.631 MHz. (De Haan, 1993).

k. These multi-mode channels are to be used for experimenting with new transmission technologies (De Haan, 1993)

l. In the United Kingdom the use of low-power speech repeaters on repeater channels in the segment 438.419--438.581 is allowed. Where necessary, frequencies will be coordinated with neighbouring countries (De Haan, 1993).

m. Experiments using wide band digital modes may take place in the 435 MHz band in those countries that have the full 10 MHz allocation. These experiments should be in the all modes section around a frequency of 434 MHz, use horizontal polarisation and the minimum power required.(Tel Aviv 1996)

n. Common frequencies for Simplex (FM) Internet voice gateways are:
433.950, 433.9625, 433.975, 433.9875, 434.0125, 434.434.025, 434.0375, 434.050 MHz
(Cavtat 2008)

o. All Voice repeater channels may use FM or Digital Voice modes. (Cavtat 2008)

4.6 1240 - 1300 MHz BANDPLAN

Frequency MHz	Maximum Bandwidth	MODE	USAGE
1240.000 **1240.500**	2700 Hz	ALL MODE	(reserved for future)
1240.500 **1240.750**	500Hz	Telegraphy MGM	Beacons (reserved for future)
1240.750 **1241.000**	20kHz	FM Digital voice	(reserved for future)

1240.000 **1243.250**	20kHz	ALL MODE	1240.000-1241.000 1242.025-1242.250 1242.275-1242.700 1242.725-1243.250	Digital communications Repeater output, ch. RS1 - RS10 Repeater output, ch. RS11 - RS28 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 1270.725-1271.250	Repeater input, ch. RS1 -- RS28 Packet Radio duplex, ch. RS29 -- RS50
1272.000 **1290.994**	(d)	ATV Digital ATV		
1290.994 **1291.481**	20kHz	FM Digital voice Repeater INPUT	RM0 (1291.000) -- RM19 25kHz spacing RM19 (1291.475)	
1291.494 **1296.000**	(d)	ALL MODES	1293.150-1294.350 R20 (1293.150) R68 (1294.350)	Repeater input,

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
1296.000 **1296.150**	500Hz	Telegraphy MGM	1296.00-1296.025 1296.138	Moonbounce PSK31 centre of activity
1296.150 **1296.800**	2700Hz	Telegraphy SSB MGM	1296.200 1296.400-1296.600 1296.500 1296.600 1296.600-1296.700 1296.750-1296.800	Narrow-band centre of activity Linear transponder input Image center (SSTV, Fax etc) Narrowband Data center (MGM, RTTY,..) Linear transponder output Local Beacon (10W ERP max)
1296.800 **1296.994**	500Hz	Telegraphy MGM	Beacons exclusive (b)	
1296.994 **1297.481**	20kHz	FM Digital voice Repeater OUTPUT	RM0 (1297.000) 25 KHz spacing RM19 (1297.475)	
1297.494 **1297.981**	20kHz	FM (c) **Digital Voice (e)**	SM20 (1297.500) (25 KHz spacing - SIMPLEX) 1297.500 FM center of activity 1297.725 Digital Voice calling (25 KHz spacing - SIMPLEX) 1297.900-1297.975 Simplex FM Internet voice gateways SM39 (1297.975)	
1298.000 **1299.000**	20kHz	All modes	General mixed analogue or digital use in 25 kHz channels 1298.025MHz (RS1) 1298.975MHZ (RS39)	
1299.000 **1299.750**	150kHz	All modes	Arranged as 5 x150kHz channels for high speed Digital Data (DD) usage: Centres: 1299.075, 1299.225, 1299.375, 1299.525, 1299.675 MHz (+/- 75kHz)	
1299.750 **1300.000**	20kHz	All modes	8x25kHz channels (available for FM/DV use) : Centres: 1299.775-1299.975	

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.

At the IARU Region-1 Conference at Cavtat (2008), Recommendation CT08_C5_27 was adopted which designated the 1240.0-1240.75MHz segment as an alternative narrowband section and makes a series of recommendations for replanning other parts of the band for DATV and Digital Voice & Data

1.1. Footnotes

a. deleted
b. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11
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.
e. This segment is for simplex use only with no Digital Voice gateways. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by other modes

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.

4.7 2300 -2450 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
2300.000 SUB-REGIONAL (national) BANDPLANNING (a) **2320.000**	20 kHz	ALL MODES	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**	500 Hz	TELEGRAPHY EXCLUSIVE (**c**)	2320.000-2320.025 EME 2320.138 PSK31 centre of activity
2320.150 **2320.800**	2700 Hz	TELEGRAPHY/ SSB (**c**)	2320.200 SSB centre of activity 2320.750-2320.800 Local Beacons (10W ERP max)
2320.800 **2321.000**		Telegraphy MGM	BEACONS EXCLUSIVE (c)
2321.000 **2322.000**	20 kHz	FM and Digital Voice	VOICE 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 FM 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

c) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band
Section **Fehler! Verweisquelle konnte nicht gefunden werden.**

4.8 3400 -3475 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
3400.000 **3400.800**	500 Hz	Telegraphy MGM	3400.100 Center of activity and EME (b) 3400.750-3400.800 Local Beacon (d)
3400.800 **3400.995**		MGM Telegraphy	BEACONS ONLY (e)
3401.000 **3402.000**	2700 Hz	ALL MODE	
3402.000 **3410.000**		ALL MODE	SATELLITE DOWNLINKS (a) (c)
3410.000 **3475.000**		ALL MODE	

NOTES ON THE 3400 – 3475 MHz BANDPLAN

a) CEPT Footnote EU17 permits Amateur Service in 3400-3410MHz

b) EME Centre of Activity has migrated from 3456 to 3400.1MHz to promote harmonised usage and activity

c) Amateur Satellite Service is allocated in 3400-3410MHz in Regions 2&3 and in some countries of Region-1.

d) 3400.750-3400.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.

e) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band

4.9 5650 - 5850 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
5650.000 **5668.000**	2700 Hz	ALL MODES	AMATEUR SATELLITE SERVICE (up-link)
5668.000 **5670.000**	2700 Hz	ALL MODES	5668.200 Narrow band center of activity (a) AMATEUR SATELLITE SERVICE (up-link)
5670.000 **5700.000**		MGM	
5700.000 **5720.000**		ATV	
5720.000 **5760.000**		ALL MODES	
5760.000 **5760.800**	2700 Hz	ALL MODES	5760.200 Narrow band center of activity (a) 5760.750-5760.800 Local Beacon (d)
5760.800 **5760.990**		Telegraphy MGM	BEACONS ONLY
5761.000 **5762.000**	2700 Hz	ALL MODE	
5762.000 **5790.000**		ALL MODES	
5790.000 **5850.000**		ALL MODES	AMATEUR SATELLITE SERVICE (down-link)

NOTES ON THE 5650 - 5850 MHz BANDPLAN

Footnotes

a) Societies are urged to inform their members that stations should preferably be able to operate in both narrow-band segments.
b) 5760.750-5760.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.
d) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11.

4.10 10.000 - 10.500 GHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
10.000 **10.150**		MGM	
10.150 **10.250**		ALL MODES	
10.250 **10.350**		MGM	
10.350 **10.368**		ALL MODES	
10.368 **10368.800**	2700 Hz	ALL MODES	10.3682 Narrow band center of activity 10368.750-10368.800 Local Beacon (d)
10.368.800 **10.368.990**			BEACONS ONLY (c)
10.369 **10.370**	2700 Hz	ALL MODES	
10.370 **10.450**		ALL MODES	
10.450 **10.500**		ALL MODES	10.450-10.452 Narrow band modes in countries where 10.368-10.370 is not available AMATEUR SATELLITE SERVICE

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.
b) 10368.750-10368.800 may be designated for Local Beacon use (10W ERP max) by National Societies.
d) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11

4.11 24.000 - 24.250 GHz BANDPLAN (San Marino 2002)

Frequency	Maximum Bandwidth	Mode	Usage
24.000 **24.048**		ALL MODES	
24.048 **24.048.800**	2700 Hz	ALL MODES	24.0482 Narrow band center of activity AMATEUR SATELLITE SERVICE NARROW BAND MODES 24048.750-24048.800MHz Local Beacon (b)
24.048.800 **24.048.995**		ALL MODES	BEACONS (d)
24.049 **24.050**	2700 Hz	ALL MODES	AMATEUR SATELLITE SERVICE & NARROW BAND MODES
24.050 **24.250**		ALL MODES	24.125 Preferred operating frequency for wide-band equipment (not preferred) (a)

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.
b) 24048.750-24049.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.
d) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band

4.12 47.000 - 47.200 GHz BANDPLAN (Vienna 2004)

Frequency	Maximum Bandwidth	Mode	Usage
47.000 **47.088**		ALL MODES	
47.088 **47.090**	2700 Hz	ALL MODES	47.088200 Narrow band center of activity AMATEUR SATELLITE SERVICE
47.090 **47.200**		ALL MODES	

4.13 134 - 141 GHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
134.000 **134.928**		ALL MODES	AMATEUR SATELLITE SERVICE
134.928 **134.930**	2700 Hz	ALL MODES	Narrow band centre of activity
134.930 **136.000**		ALL MODES	
136.000 **141.000**		ALL MODES	Not Preferred (a)

4.14 75.50-81.50 GHz BANDPLAN (Davos 2005)

Frequency	Maximum Bandwidth	Mode	Usage
75.500 **76.000**	2700 Hz	All Mode	AMATEUR SATELLITE SERVICE (Preferred [**1**]) 75976.200 MHz : Preferred Narrow band centre of activity
76.000 **77.500**		All Mode	76032.200 MHz :Narrow Band Centre of activity in some countries (not preferred) [**2**]
77.500 **77.501**	2700 Hz	All Mode	77500.200 MHz: Preferred NB centre of activity in countries outside the CEPT area (non-preferred / preferred)[**3**] AMATEUR SATELLITE SERVICE
77.501 **78.000**		All Mode	ALL MODES (Preferred segment)
78.000 **81.500**		All Mode	ALL MODES (not preferred)

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 between 75,5-76 GHz 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

4.15 122.25 - 123 GHz Bandplan (San Marino 2002)

Frequency	Maximum Bandwidth	Mode	Usage
122.250 **122.251**	2700 Hz	All Mode	NARROW BAND MODES
122.251 **123.000**		All Mode	

4.16 134 - 141 GHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
134.000 **134.928**		ALL MODES	AMATEUR SATELLITE SERVICE
134.928 **134.930**	2700Hz	ALL MODES	134.930 GHz Narrow band center of activity
134.930 **136.000**		ALL MODES	
136.000 **141.000**		ALL MODES	(not preferred) (a)

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

4.17 241 - 250 GHz BANDPLAN (San Marino 2002)

Frequency	Maximum Bandwidth	Mode	Usage
241.000 **248.000**		ALL MODES	(not preferred) (a)
248.000 **248.001**		ALL MODES	AMATEUR SATELLITE SERVICE & NARROW BAND MODES
248.001 **250.000**		ALL MODES	(Preferred segment)

Footnotes

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

5 IARU REGION 1 50MHz / 145MHz / UHF and MICROWAVES CONTESTS

5.1 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). The millimeter group was introduced during the meeting of the VHF Working Group in Vienna, March1986, with the aim of promoting the use of these Amateur Service bands. In October 1987 this extended rule was applied for the first time.

As of 1970 an SWL contest was established, to be run concurrently with the official Region 1 VHF and UHF/Microwaves contests. The conference in DAVOS (2005) decided to discontinue the Region 1 VHF/UHF/Microwaves SWL contest.

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 :

- The 50 MHz contest during the third weekend of June.
- The VHF contest during the first weekend of September - only on 145 MHz;
- The UHF/Microwaves contest during the first weekend of October on 435 MHz and higher bands;
- The ATV contest during the second weekend of September;

Member societies of IARU Region 1 organise and judge the results of the above contests. The procedures for the organisation of the 50MHz, 145MHz and UHF/Microwaves contests are set out in chapter 5.2.

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 chapter 5.3 (50MHz, 145MHz, UHF, Microwaves), and 5.7 (ATV).

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.

5.2 PROCEDURE FOR ORGANISING IARU REGION 1 50MHz/145MHz/UHF/MICROWAVE CONTESTS

A) 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, UHF/Microwaves, 50 MHz and ATV contests in that year, containing an up-to-date copy of the rules for these contests.

~~B) 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.~~

C) The IARU-R1 contest robot will be used for contest evaluation after 1. January 2012. Therefore, it is herewith proposed that the already existing evaluation tool be put into operation with immediate effect (as of January 2012), and be improved on in a systematic process. It is better to use a very fast, but not yet perfect tool, so that an immediate ranking can be established within minutes after four weeks.

There will be two ways to upload the logs:

- The restricted input gate for contest and VHF managers who already checked the logs,
- The open individual gate for individual amateurs not able to use (a). These logs are to be checked manually before processing.

The final evaluation is the responsibility of the organizing society.

D) 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!

E) 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).

F) 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.

G) 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.

H) 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). 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 section. Optionally certificates for all participants may be provided for distribution by national societies. See also chapter 13.

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

5.3 RULES IARU REGION 1 50 MHz, 145 MHz and UHF/MICROWAVES CONTESTS

5.3.1 Eligible entrants

All licensed radio amateurs in Region 1 may participate in the contest. Multiple operator entries will be accepted, provided only one callsign per band is used during the contest . 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 (see section 5.3.3)

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.

5.3.2 Contest sections

The contests shall comprise the following sections for each band from 50 MHz to 10 GHz and for Millimeter group (the combined group of amateur bands above 10 GHz) :

- Section SINGLE - Stations operated by a single operator, with no assistance during the contest.
- Section MULTI - All other entrants
- Section ROVER (SINGLE) (1,2 GHz and UP) - This new class will be introduced in 2012
  A Rover station is a station travelling (and taking all its equipment and antennas) to more than one location during the same contest. Rover stations should indicate that they are operating as such, for example by calling “CQ Rover” and current locator.
  A Rover station can be worked more than once, on the condition that the Rover has changed from locator square and moved at least 5km, this means a change of one of the 4 first digits (e.g. from JO32.. to JO31..).
  The final score of the Rover station is the sum of the logs per square. A Rover station makes a specific EDI file for each locator. The sum of the different logs will be the final result of the Rover station.
  This new class will be introduced in 2012, subject to agreement on rules at the 2011 conference.

5.3.3 Operating

a) The 144,500 – 144,700 MHz segment may also be used for contest QSOs during the Sub-regional contests on the coordinated dates and during IARU Region I VHF contest as the extension to the currently used segment 144,000 – 144,399 MHz.

- The use of this extension or part thereof must be clearly specified and published in the contest rules.

- The extension is time limited from Jan-1 2012 to Dec-31 2014 unless renewed by a future conference decision.

Thus C5 recommends that the 144 all mode segment is utilised for the contests. The bandplan is already clear on the allocations.

b) No more than one transmitter per band may be in use at any one time.

c) A participating station must operate from the same location throughout the event.

d) 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.

OPERATOR may reside outside the station's area ("remote station"), connected to the station via a "remote control terminal". In such a case, the Locator for the contest is the Locator of the station's position. An operator may only operate one single station, regardless if it is locally or remotely operated, during the same event.

5.3.4 Date of contests

- The **50 MHz** contest will begin on the third Saturday of June.
- The **145 MHz** contest shall start on the first Saturday of September.
- The **UHF/Microwave** contest will start on the first Saturday of October.

5.3.5 Duration of contests

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

5.3.6 Contacts

Each station may only be worked once per band, whether it is fixed, portable or mobile. If a station is worked again during the same contest on the same band, only one contact may count for points (except in the case of Rover stations), but any duplicate contacts should be logged without claim for points and clearly marked as duplicates.

Contacts made via active repeaters and EME contacts do not count for points.

Competitors are obliged to follow common definition for a valid QSO (described in the VHF Managers Handbook). The contest exchange (call, report, QSO number and locator) shall be sent and confirmed on the band where the contact started and only during the QSO.

5.3.7 Type of emission

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

5.3.8 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 chapter 8.6.1

5.3.9 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 kilometres 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 that only a 4-character locator has been received (50 MHz), the contact is invalid.
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 (Millimeter group) 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
47 GHz	2 x
75/80 GHz	3 x
122 GHz	4 x
134 GHz	8 x
245 GHz	10 x

5.3.10 Entries

The entries must be set out in digital/electronic form fulfilling the requirements under rule 5.3.13. Logs must be sent to the national VHF Manager or the national Contest Committee and parallel the IARU Contest robot 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.

5.3.11 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.
Any error in the exchanged information logged by a station is liable to result in the loss of all points for that contact for both correspondents (receiving and transmitting station); subject to review and confirmation by the contest organiser.

5.3.12 Awards

- **Section winners:**
  Certificates will be issued by the organising society to the winners in the two sections on each band up to 10 GHz and for the Millimeter group.

- **Overall winners for UHF/Microwave contest:**
  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 will be combined, using an adaptive multiplier system:

  435 MHz
  1.3 GHz
  2.4 GHz
  5.7 GHz
  10 GHz
  Millimeter 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 millimeter group the scores as determined according to rule 5.3.9 are used for the determination of this group's multiplier.

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)

5.3.13 Logs

The logs shall be in the format defined in Section 5.10

Please visit also the IARU Contest robot: **iaru.oevsv.at**

5.4 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	
2002	SRAL	
2003 Sept	SARA	
2003 Oct	ZRS	
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	
2009 Sept	REF	
2009 Oct	PZK	
2010 Sept	SARA	
2010 Oct	ZRS	
2011 Sept	DARC	
2012 Sept		
2012 Oct.		

5.5 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
2009	UBA
2010	REF
2011	UBA
2012	UBA

5.6 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	
2009	PZK	
2010	UBA	
2011	VERON	
2012		

5.7 RULES IARU REGION I SEPTEMBER ATV CONTEST

5.7.1 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.

A station operating under section 1 on any single band will automatically be classified also as such on the other bands where ATV is allowed.

5.7.2 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.

5.7.3 Date of contest

The contest will begin on the second Saturday of September.

5.7.4 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).

5.7.5 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.

5.7.6 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.

5.7.7 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.

5.7.8 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).

5.7.9 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.

5.7.10 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.

5.7.11 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.

5.7.12 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.

5.8 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. 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 8

5.9 LOGBOOK PROGRAMS SUPORRTING EDI

http://www.rudius.net/oz2m/taclog/
http://www.ucxlog.org/
http://www.win-test.com/
http://lea.hamradio.si/~s52aa/vhfctest4win/
http://saigacontest.gmxhome.de/
http://www.n1mm.com/

5.10 STANDARD FORMAT FOR ELECTRONIC CONTEST LOG EXCHANGE (VIENNA 1998)

Electronic Data Interchange - EDI-file format for contests in Region 1 above 30 MHz. This document is the specification for the Region 1 above 30 MHz contest file formats. Examples for commonly known contests are shown in the appendix.
The aim is to make contest-log programmers able to deliver a standard (file) format from their programs, to enable contest managers to receive log data through various types of digital communication systems e.g. diskettes, e-mail, etc; for electronic evaluation purposes. (Prepared by: Bo Hansen, OZ1FDJ, Søren Pedersen, OZ1FTU)

5.10.1 Format

```
  [REG1TEST;1]File identifier;file version
F TName=Contest name
  TDate=Beginning;ending date of contest
  PCall=Callsign used
  PWWLo=WWL used
  PExch=Exchange used
F PAdr1=Address line 1 from where the contest took place
F PAdr2=Address line 2 from where the contest took place
F PSect=Section in which station participates
  PBand=Band used during the contest
  PClub=Club station where points can be accumulated
F RName=Name of responsible operator
  RCall=Callsign of responsible operator
F RAdr1=Address line 1 of responsible operator
F RAdr2=Address line 2 of responsible operator
F RPoCo=Postal code of responsible operator
F RCity=City of responsible operator
F RCoun=Country of responsible operator
F RPhon=Phone number of responsible operator
F RHBBS=Home BBS of responsible operator
  MOpe1=Multi operator line 1
  MOpe2=Multi operator line 2
F STXEq=TX equipment
F SPowe=TX power [W]
F SRXEq=RX equipment
F SAnte=Antenna
F SAntH=Antenna height above ground level [m];height above sea level [m]
  CQSOs=Claimed number of valid QSOs;Band multiplier
  CQSOP=Claimed number of QSO-points
  CWWLs=Claimed number of WWLs;Bonus per each new WWL;WWL multiplier
  CWWLB=Claimed number of WWL bonus points
  CExcs=Claimed number of Exchanges;Bonus per each new Exchange;Exchange multiplier
  CExcB=Claimed number of Exchange bonus points
  CDXCs=Claimed number of DXCCs;Bonus per each new DXCC;DXCC multiplier
  CDXCB=Claimed number DXCC bonus
  CToSc=Claimed total score
  CODXC=Call;WWL;distanceBest DX contact
  [Remarks]Remarks identifier
F Remarks lines
  [QSORecords;Number of QSO records following]QSO records identifier;number of QSO records    following
  Date;Time;Call;Mode code;Sent-RST;Sent QSO number;Received-RST;Received QSO number;
  Received exchange;Received-WWL;QSO-Points;New-Exchange-(N);New-WWL-(N);
  New-DXCC-(N);Duplicate-QSO-(D)
```

5.10.2 Explanation of keywords

Keywords are defined as the word in front of the actual argument. The keyword is separated from the argument with an equal sign (=).

[REG1TEST;1]

REG1TEST;1 is the file identifier and the file version. It serves as indicator for which format and version is being used and where data begins.

TName
Argument describes the name of the contest in which the station participated.

TDate
Arguments describe the beginning and ending dates of the contest. Arguments are separated with a semicolon (;). Arguments are written as YYYYMMDD.

PCall
Argument describes the callsign used during the contest.

PWWLo
Argument describes own World Wide Locator (WWL, Maidenhead, Universal Locator) used during the contest. Maximum length is six characters.

PExch
Argument describes own Exchange during the contest. This can be any type of information, e.g. Province, DOK, County, State, Power, Name. Maximum length is six characters.

PAdr1
Argument describes the address of the QTH used during the contest, line 1.

PAdr2
Argument describes the address of the QTH used during the contest, line 2.

PSect
Argument describes in which section the station is participating. Synonyms to the meaning Asection@ are: class, category, group etc.

PBand
Argument describe which band was used during the contest. Please note the bands and which frequency range they represent in the table below:

Frequency		*PBand*
50 - 54 MHz	=	50 MHz
70 - 70,5 MHz	=	70 MHz
144 - 148 MHz	=	145 MHz
430 - 440 MHz	=	435 MHz
1240 - 1300 MHz	=	1,3 GHz
2300 - 2450 MHz	=	2,3 GHz
3400 - 3600 MHz	=	3,4 GHz
5650 - 5850 MHz	=	5,7 GHz
10,0 - 10,5 GHz	=	10 GHz
24,0 - 24,25 GHz	=	24 GHz
47,0 - 47,2 GHz	=	47 GHz
75,5 - 81 GHz	=	76 GHz
120 - 120 GHz	=	120 GHz
142 - 148 GHz	=	144 GHz
241 - 250 GHz	=	248 GHz

PClub
Argument describes the callsign of the radio club where operator(s) are member. Can be used if points are accumulated to the club etc.

RName
Argument describes the given- and surname of the responsible operator.

RCallArgument describes the callsign of the responsible operator.

Adr1
Argument describes the address of the responsible operator, line 1.

RAdr2
Argument describes the address of the responsible operator, line 2.

RPoCo
Argument describes the postal code of the responsible operator.
RCity
Argument describes the city of the responsible operator.

RCoun
Argument describes the country of the responsible operator.

RPhon
Argument describes the telephone number of the responsible operator.

RHBBS
Argument describes the Bulletin Board System or electronic mail address of the responsible operator.

MOpe1
Arguments describe the operators participating in the contest, line 1. All arguments separated with a semicolon (;). Responsible operator is not needed in this argument.

MOpe2
Arguments describe the operators participating in the contest, line 2. All arguments are separated with a semicolon (;).Responsible operator is not needed in this argument.

STXEq
Argument describes the transmitting equipment used during the contest.

SPowe
Argument describes the transmitting power used during the contest, unit is Watt.

SRXEq
Argument describes the receiving equipment used during the contest.

SAnte
Argument describes the antenna system used during the contest.

SAntH
Arguments describe the antenna height above ground level and sea level, unit is meter. All arguments separated with a semicolon (;).

CQSOs
Arguments describe the claimed number of valid QSOs and the band multiplier. All arguments are separated with a semicolon (;).

CQSOP
Argument describes the claimed total number of QSO-points. The format does not specify that QSO-points can only be based upon distances.

CWWLs
Arguments describe the claimed number of WWLs worked, the number of bonus points claimed for each new WWL and the WWL multiplier. All arguments are separated with a semicolon (;).
If no bonus points are claimed then bonus points per each new WWL are set to zero (0). If no multiplication is used for each new WWL the multiplier is set to one (1).

CWWLB
Argument describes the claimed total number of WWL bonus points.

CExcs
Arguments describe the claimed number of Exchanges worked, the number of bonus points claimed for each new Exchange and the Exchange multiplier. All arguments are separated with a semicolon (;).

If no bonus points are claimed then bonus points per each new Exchange are set to zero (0). If no multiplication is used for each new Exchange the multiplier is set to one (1).
CExcB
Argument describes the claimed total number of Exchange bonus points.

CDXCs
Arguments describe the claimed number of DXCCs worked, the number of bonus points claimed for each new DXCC and the DXCC multiplier. All arguments are separated with a semicolon (;).

If no bonus points are claimed then bonus points per each new DXCC are set to zero (0). If no multiplication is used for each new DXCC the multiplier is set to one (1).

CDXCB
Argument describes the claimed total number of DXCC bonus points.

CToSc
Argument describes the total claimed score. The format does not specify how the total score is calculated.

CODXC
Arguments describe the claimed ODX contact call, WWL and distance. All arguments are separated with a semicolon (;).

[Remarks]
The [Remarks] identifier is used to mark where the Remarks begins. All lines following, until [QSORecords;Number of QSO records following], are remarks. If no remarks are written identifier must still be present.

Remarks lines
Remarks lines are where the station may write comments to the test. The number of lines is variable. All lines in between [Remarks] and [QSORecords;Number of QSO records following] are remarks.

[QSORecords;Number of QSO records following]
The [QSORecords;Number of QSO records following] is the QSO record identifier used to mark where QSO records begins, and how many consecutive QSO records to follow.

QSO record definition
Date;Time;Call;Mode code;Sent-RST;Sent QSO number;Received RST;Received QSO number;Received Exchange;Received-WWL;QSO-Points;New-Exchange-(N);New-WWL-(N);New-DXCC-(N);Duplicate-QSO-(D)
All arguments are separated with a semicolon (;).

All fields in the QSO record is written on the same line, and ending with ASCII characters 13 and 10 (CR LF).

Field		*Maximum length*	
Date	=	YYMMDD, 6 characters	6
Time	=	UTC, 4 characters, with leading zeros	4
Call	=	3 to 14 characters	14
Mode code	=	0 or 1 character	1
Sent-RST	=	0 or 2 or 3 characters	3
Sent QSO number	=	0 or 3 or 4 characters, with leading zeros	4
Received-RST	=	0 or 2 or 3 characters	3
Received QSO number	=	0 or 3 or 4 characters, with leading zeros	4
Received Exchange	=	0 or 1 to 6 characters (see also PExch)	6
Received WWL	=	0 or 4 or 6 characters, World Wide Locator	6
QSO points	=	1 to 6 characters, including bandmultiplier	6
New-Exchange	=	0 or 1 character, "N" if QSO is a new exchange	1
New-WWL	=	0 or 1 character, "N" if QSO is a new WWL	1
New-DXCC	=	0 or 1 character, "N" if QSO is a new DXCCL	1
Duplicate-QSO	=	0 or 1 character, "D" if contact is a duplicate QSO	1
			61
			+ field separators, 14
			75

Mode code
The mode code is used to show which modes were used for the QSO. Below is a list of the code with corresponding modes.

Mode code	*TX mode*	*RX mode*
0	non of below	non of below
1	SSB	SSB
2	CW	CW
3	SSB	CW
4	CW	SSB
5	AM	AM
6	FM	FM
7	RTTY	RTTY
8	SSTV	SSTV
9	ATV	ATV

If the mode is not important it can be left blank, i.e. not stated in rules/invitation.

Characters
Used characters are in accordance with the 7-bit ASCII alphabet and only characters with the following decimal number are allowed 10, 13, 32-127.

Line length
If line length is already specified it must not be exceeded, other lines must not exceed a length of 75 characters. Length is limited due to Packet Radio transferral.

All lines, in the format description, with the "F" denote that entry is a *free format*. This means that any of the above characters in the 7-bit ASCII alphabet can be used.

All other entries are *forced format* and characters, as above, are in capital. All numbers in forced format are positive integers and non-exponential notation and entry can not be left empty, i.e. 0 (zero) or greater. All forced formats must be in accordance with SI-units (Système International).

Separator (;)
This separator semicolon (;) is written to separate multiple information on same line.
If the format is used for a contest which does not use some of the QSO exchanges, i.e. QSO no., WWL and Exchange, these fields are left blank. Proper interpretation must be ensured by manager program.

Faulty QSOs
A duplicate QSO is marked with a "D" in the Duplicate-QSO field, and the QSO-points field is set to 0 (zero). The format does not define when a QSO is a duplicate.

An incomplete QSO is written with the information received, and the QSO-points field is set to zero (0).

In case of a mistake, an error mark must be inserted in the Callsign field to keep a correct flow in the number of QSOs records. The error mark must be an "ERROR" and the other fields except Time and Sent QSO no., if used, can be left empty. In case the empty field is accumulated, e.g. QSO-points, it is set to 0 (zero).

QSO numbers
The format does not define in what order the QSO numbers must be listed. It is possible to use the format to submit logs for contests requiring consecutive numbers for all QSOs, even if they are on different bands.

Missing information
If a contest log program can not fill in all the information, the missing information can be left blank, except if information is needed for claiming/calculating scores, e.g. log program cannot identify WWLs, DXCCs etc. If the information is required for the scores this log program can not be used for this particular contest anyway.

The following section describes different EDI-files for various commonly known contest types.

5.10.3 Region 1 Contest, standard type

```
[REG1TEST;1]
TName=IARU Region 1, March contest VHF
TDate=19950304;19950305
PCall=OZ1FDJ
PWWLo=JO65FR
PExch=
PAdr1=Herlevgaardsvej 32 A, st. tv., DK-2730 Herlev
PAdr2=
PSect=Multi operator
PBand=144 MHz
PClub=OZ2AGR
RName=Bo Hansen
RCall=OZ1FDJ
RAdr1=Herlevgaardsvej 32 A, st. tv.
RAdr2=
RPoCo=DK-2730
RCity=Herlev
RCoun=DENMARK
RPhon=(+45) 42 91 53 98
RHBBS=OZ6BBS
MOpe1=OZ1FTU
MOpe2=
STXEq=FT-225RD+MRF247
SPowe=90
SRXEq=FT-225RD+MuTek+BF981 1,5 dB NF
SAnte=9 elements OZ5HF
SAntH=14;41
CQSOs=24;1
CQSOP=11579
CWWLs=19;0;1
CWWLB=0
CExcs=0;0;1
CExcB=0
CDXCs=7;0;1
CDXCB=0
CToSc=11579
CODXC=OY9JD;IP62OA;1302
[Remarks]
Nice with the Aurora, made it possible to work more than usual
in a 24 h contest. Nice to hear Jon (OY9JD) again, but, many
stations calling so no time for chat.
Besides the Aurora there was only little activity, as usual, in Scandanivia.
[QSORecords;26]
950304;1445;OZ9SIG;1;59;001;59;006;;JO65ER;6;;N;N;
950304;1446;DL5BBF;1;54;002;59;023;;JO42LT;396;;N;N;
950304;1449;OZ1HLB/P;1;59;003;59;015;;JO55US;48;;N;;
950304;1450;DL6FBL;1;53;004;51;092;;JO40XL;608;;N;;
950304;1454;DF0TAU;1;54;005;59;084;;JO40QO;606;;;;
950304;1508;DJ3QP;1;55;006;59;095;;JO42FB;485;;;;
950304;1510;DG5TR;1;53;007;53;006;;JO53QP;242;;N;;
950304;1519;DL0WU;1;55;008;53;108;;JO31OF;609;;N;;
950304;1528;DL3LAB;1;59;009;59;046;;JO44XS;191;;N;;
950304;1532;DL5XV;1;56;010;59;033;;JO53AO;283;;;;
950304;1544;OZ8RY/A;1;56;011;57;010;;JO66HB;39;;N;;
950304;1553;OZ1AOO;1;59;012;59;001;;JO65FR;1;;;;
950304;1603;ERROR;;;013;;;;;0;;;;
950304;1618;DL0WX;1;53;014;52;174;;JO30FQ;688;;N;;
950304;1626;SM4HFI;2;53A;015;54A;019;;JP70TO;573;;N;N;
950304;1631;GM4YXI;2;57A;016;55A;015;;IO87WI;911;;N;N;
950304;1636;OH2AAQ;2;52A;017;59A;015;;KO29FX;851;;N;N;
950304;1640;OH2BNH;2;55A;018;57A;024;;KP20LG;891;;N;;
950304;1641;LA2AB;1;59A;019;57A;027;;JO59FV;479;;N;N;
950304;1646;SM5BSZ;2;55A;020;57A;029;;JO89IJ;480;;N;;
950304;1700;SK5BN;2;51A;021;55A;026;;JP80UE;585;;N;;
950304;1720;DL9LBA;2;529;022;559;056;;JO44UP;213;;;;
950304;1730;SK6NP;2;559;023;539;029;;JO68MB;262;;N;;
950304;1736;OH1MDR;2;52A;024;57A;023;;KP01VJ;830;;N;;
950304;1739;OY9JD;2;51A;025;52A;011;;IP62OA;1302;;N;N;
950304;1826;OZ9SIG;1;59;026;59;006;;JO65ER;0;;;;D
```

5.10.4 AGCW DL VHF Contest (contest manager: DJ2QZ)

```
[REG1TEST;1]
TName=AGCW contest 2 m
TDate=19950318;19950318
PCall=OZ1FDJ
PWWLo=JO65FR
PExch=C
PAdr1=Herlevgaardsvej 32 A, st. tv., DK-2730 Herlev
PAdr2=
PSect=C
PBand=144 MHz
PClub=OZ2AGR
RName=Bo Hansen
RCall=OZ1FDJ
RAdr1=Herlevgaardsvej 32 A, st. tv.
RAdr2=
RPoCo=DK-2730
RCity=Herlev
RCoun=DENMARK
RPhon=(+45) 42 91 53 98
RHBBS=OZ6BBS
MOpe1=
MOpe2=
STXEq=FT-225RD+MRF247
SPowe=90
SRXEq=FT-225RD+MuTek+BF981 1,5 dB NF
SAnte=9 elements OZ5HF
SAntH=14;41
CQSOs=24;1
CQSOP=11579
CWWLs=19;500;1
CWWLB=9500
CExcs=3;0;1
CExcB=0
CDXCs=7;0;1
CDXCB=0
CToSc=11579
CODXC=OY9JD;IP62OA;1302
[Remarks]
Nice with the Aurora, made it possible to work more than usual.
Nice to hear Jon (OY9JD) again, but, many stations calling so no time for chat.
Besides the Aurora there was only little activity, as usual, in Scandanivia.
[QSORecords;26]
950318;1600;OZ9SIG;2;599;001;599;006;B;JO65ER;6;N;N;N;
950318;1602;DL5BBF;2;549;002;599;023;C;JO42LT;396;N;N;N;
950318;1607;OZ1HLB/P;2;599;003;599;015;C;JO55US;48;;N;;
950318;1609;DL6FBL;2;539;004;519;092;C;JO40XL;608;;N;;
950318;1614;DF0TAU;2;549;005;599;084;B;JO40QO;606;;;;
950318;1618;DJ3QP;2;559;006;599;095;C;JO42FB;485;;;;
950318;1625;DG5TR;2;539;007;539;006;A;JO53QP;242;N;N;;
950318;1628;DL0WU;2;559;008;539;108;C;JO31OF;609;;N;;
950318;1630;DL3LAB;2;599;009;599;046;C;JO44XS;191;;N;;
950318;1632;DL5XV;2;569;010;599;033;C;JO53AO;283;;;;
950318;1644;OZ8RY/A;2;569;011;579;010;A;JO66HB;39;;N;;
950318;1653;OZ1AOO;2;599;012;599;001;A;JO65FR;1;;;;
950318;1703;ERROR;;;013;;;;;0;;;;
950318;1718;DL0WX;2;539;014;529;174;C;JO30FQ;688;;N;;
950318;1726;SM4HFI;2;53A;015;54A;019;C;JP70TO;573;;N;N;
950318;1731;GM4YXI;2;57A;016;55A;015;C;IO87WI;911;;N;N;
950318;1736;OH2AAQ;2;52A;017;59A;015;C;KO29FX;851;;N;N;
950318;1740;OH2BNH;2;55A;018;57A;024;C;KP20LG;891;;N;;
950318;1741;LA2AB;2;59A;019;57A;027;C;JO59FV;479;;N;N;
950318;1746;SM5BSZ;2;55A;020;57A;029;C;JO89IJ;480;;N;;
950318;1800;SK5BN;2;51A;021;55A;026;C;JP80UE;585;;N;;
950318;1820;DL9LBA;2;529;022;559;056;C;JO44UP;213;;;;
950318;1830;SK6NP;2;559;023;539;029;B;JO68MB;262;;N;;
950318;1836;OH1MDR;2;52A;024;57A;023;C;KP01VJ;830;;N;;
950318;1839;OY9JD;2;51A;025;52A;011;C;IP62OA;1302;;N;N;
950318;1846;OZ9SIG;2;599;026;599;006;B;JO65ER;0;;;;D
```

5.11 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. Since 1974 ARI has organised the Marconi Memorial Telegraphy contest during this weekend and has invited all Region 1 amateurs to participate.

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.

National VHF Managers or properly nominated Contest Committees should send the electronic contest log data entries from IARU R1 contests to a special web page to allow an exchange of logs for more accurate national evaluation. (Cavtat 2008). At present time **http://hamradio.pl/sp7njx/index.php** is in use.

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 4.14.

Information exchange on contests

To ensure that participants in the various contests will know on which times or time intervals they may expect activity in other countries on the bands, at the Conference in Malmö (1963) and at later Conferences the importance of exchanging information on contests was stressed. At the IARU Region 1 Conference in Warsaw (1975) the following recommendation was adopted:

> In order to promote greater uniformity in the timing (and perhaps style) of Region 1 VHF/UHF/MICROWAVES contests, all member societies are invited to send well in advance of the contest dates, say annually, details of their contest calender - dates and times - in English to the Hon. Secretary of Region 1 for publication in Region 1 News and for forwarding to all VHF Managers for information.

The Hon. Secretary of Region 1 has requested to send this information to the Region 1 Secretariat not later than the 31st December of each year.

5.12 INTRODUCTION OF LOCATOR BONUS IN CONTESTS

From the EDR proposal, document NN 100 amended, submitted to the IARU Region 1 Conference at Noordwijkerhout (1987):

To encourage participants in the regional and sub-regional contests to turn their antenna towards less-populated areas, EDR proposes the introduction of a Locator-Bonus in the contest rules.

For several years this principle has, with success, been in use in Scandinavia.

If the Locator-Bonus is used, we expect top see growing activities in the "outskirts" of Europe, where it is low, dying or completely dead now. This is due to the fact that contest activity in central Europe is so high nowadays, that any good station can work "local" stations for most of the contest period. Only during the night there appears to be time to work "DX" to the remote areas.

Currently these remote stations, when participating in the contests, only work a limited number of stations during the first hours of a contest and thereafter quickly go QRT.

If the "remote" stations would get more attention by being more "attractive" (bonus points), they will, undoubtedly, also become more active and we may expect a positive development in the contest activity.

After discussion in Committee B it was decided to recommend that this system be tried out in national contests.

The following bonus system was mentioned as a starting point for the experiments:

- for each new locator square worked

  on the 145 MHz and 435 MHz bands: 1000 points
  on the microwave bands: 300 points

5.13 THE LOCATOR SYSTEM

5.13.1 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.

5.13.2 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 Alongitude@ and Alatitude@ was required. The conference decided that the latitude and longitude to be used as a reference for the determining of locators should be :

5.13.3 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 Azero 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 Azero 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.

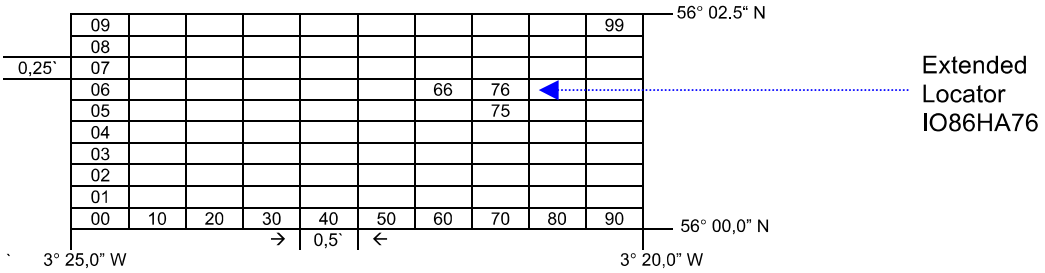
The few last years more and more maps use their latitude and longitude linked to the newer world-wide geodetic system World Geodetic System 1984, called WGS-84.

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.

5.13.4 EXTENDED LOCATOR SYSTEM

The proposed extension follows the pattern of the Locator system by dividing each sub-square into a 10 by 10 grid of even smaller squares, each 0.5 ' from west to east and 0.25 ' from south to north. These sub-sub-squares are called "micro-squares".
Two digits are added to the Locator. The first gives the longitude co-ordinate of the "micro-square" and the second the latitude co-ordinate. For example, the region covered by Locator "IO86HA" would be divided as follows:

IO86HA



Adopted at the IARU Region 1 Conference in De Haan (September 1993) on the proposal of the RSGB. This extension is intended only for use by stations who require greater precision than obtainable with the Locator system. For normal VHF/UHF/Microwave work the existing six-character Locator is adequate. This extension should be published within Region 1 and communicated to Regions 2 and 3 with a view to eventual world-wide agreement.

5.14 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.

At the Region 1 Conference in Malmö (1963) I1XD, VHF Manager of ARI, offered the **Vittoria Alata Cup** to be awarded to the highest scorer in the Region 1 UHF/Microwaves contest, irrespective of the section the winner would compete in. In 1966, at the Conference in Opatija, I1XD donated a **second Vittoria Alata Cup**, and as of that year the **Vittoria Alata Cup I** has been awarded to the winner in section 1 on 435 MHz, and the **Vittoria Alata Cup II** to the winner in section 2 on 435 MHz.

At the Region 1 Conference in Scheveningen (1972) a recommendation was adopted to establish as of 1973 overall UHF/Microwaves contest winners in each station category (section) with the aid of a multiplier system for points made on the various bands. It was decided to maintain the system established for awarding the Challenge Trophies, and to award IARU Region 1 medals to the overall UHF/Microwaves contest winners. Later it appeared to be more practical to award a **IARU REGION 1 CERTIFICATE** to those winners. Those certificates will be provided by the chairman of the VHF/UHF/Microwaves committee to the adjucating society for signature and distribution to the winners.
At the IARU Region 1 Conference in Miskolc-Tapolca (1978) the station categories (sections) were changed to

section 1	-	stations operated by a single operator, with no assistance during the contest, using privately owned equipment and antennas and operating from any location
section 2	-	all other entrants

The system for awarding the Trophies to the winners in the various sections in the 144 MHz and the 435 MHz bands was maintained.

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	M0V	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	OK1VMS	89755	DL0GTH	155374

WINNERS OF THE IARU REGION 1 CERTICICATES

Overall winners of the October UHF/Microwaves contests

Year	Winner Section 1	Points	Winner Section 2	Points
1973 SSA				
1974 SRJ				
1975 ÖVSV				
1976	DC8RAA		OK1KIR/P	
1977	DC8RLA		PA0NYM/P	
1978 USKA				
1979	PAoEZ		Martlesham R.S.	
1980 EDR				
1981	PA0EZ	126217	G4BPO/P	109149
1982 PZK				
1983	PA0EZ	205042	OK1KIR/P	294358
1984	PA0EZ		G4DUB/P	
1985	PA0EZ	230544	PA3BPC/p	297404
1986	OK1AIY/p	576690	Parallel Lines	1257576
1987	PAoEZ	267138	PEoMAR/p	372627
1988	PAoEZ	211491	HB9AMH/p	419958
1989	PAoEZ	303809	PEoMAR/p	368737
1990 BFRA				
1991	PAoEZ	373946	DLoNN	584533
1992	PAoEZ	398803	HB9AMH/p	449028
1993	PAoEZ	482820	G4JAR/p	618621
1994	PAoEZ	394768	G4VIX/p	720744
1995	DL6NAQ/p	611422	GoVHF/p	1421193
1996	DL6NAQ/p	330616	OK1KIR/p	803390
1997 FRR				
1998	DK1VC	409444	PA6NL	721699
1999	PA0EZ	524338	PA6NL	711520
2000	DK2MN	329344	PA6NL	735720
2001	PA0EZ	409630	DF0MTL	845843
2002 SRAL				
2003	G3XDY	312898	DL0GTH	806626

6 PROPAGATION RESEARCH BY AMATEURS

6.1 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 Katlenburg/Lindau 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.

6.2 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.

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 for scientific studies.

At the final Plenary Meeting of the Conference this proposal was adopted, and Charlie Newton, G2FKZ, was nominated as IARU Region 1 Coordinator for Auroral Studies.

The following recommendation relating to the auroral project was adopted at the IARU Region 1 Conference in Warsaw (1975):

> VHF Auroral Propagation: that the proposals set out in document WA32 (regarding the standardisation of auroral reporting) be adopted by member societies and that member societies publicise the reporting forms contained therein.

In 1993 G2FKZ resigned, and the IARU Region 1 Conference in De Haan (September 1993) nominated as his successor **Vaino Lehtoranta, OH2LX** (address in section If)

3. Tropospheric propagation studies

At the IARU Region 1 Conference in Warsaw (1975), on the proposal of the RSGB Propagation Studies Committee IARU Region 1 nominated as Tropospheric Propagation Studies Coordinator
Mr. R.G.Flavell, G3LTP. He resigned from this post at the conference in Tel Aviv 1996.
At the moment a successor is sought for. He will have to look into progation effects on the microwaves (such as 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. Secretrary of IARU Region I

5. Co-operation with CCIR study groups and publications

Co-operation has been established with the CCIR propagation study groups 5 for tropospheric propagation, and 6 for ionospheric propagation.

Five IARU Region 1 propagation reports were submitted to CCIR study groups via F8SH, the former IARU Region 1 Sporadic-E Studies Coordinator, and, where appropriate, the attention of CCIR study groups has been and is drawn to the results of amateur investigations/observations which could be used fruitfully in their studies.

Some scientific publications which have used amateur data are

Tropo	I.E.R.E. Conference Proceedings 40 (1978)	pp 265-280
	I.E.E. Conference Publication 169 (1978) Pt 2	pp 182-186
	I.E.E. Conference Publication 195 (1981) Pt 2	pp 163-167
	I.E.E. Conference Publication 219 (1983) Pt 2	pp 14- 18
	I.E.E. Conference Publication 248 (1985)	pp 498-501
Aurora	I.E.E. Conference Publication 219 (1983) Pt 2	pp 259-262
T.E.P.	I.E.E. Conference Publication 219 (1983) Pt 2	pp 325-328

6. Action/support required from IARU Region 1 member societies

IARU Region 1 consider it of the utmost importance that member societies stimulate and encourage the participation of amateurs in scientific and propagation studies. To this end wide publicity should be given to the projects already in progress, and possibilities for new projects and/or extensions of existing projects

should be investigated.

In all this work close co-operation with the existing Coordinators and/or coordinating institutes is strongly recommended. As already indicated, for publications member societies can obtain information at the addresses given above.
This type of work can open a whole new field of extremely interesting activities for amateurs! To mention a few examples:

a) Now that in some European Region 1 countries the 50 MHz band has been opened for amateur use, every effort should be made to increase the number of beacons and observation stations on this band, where many propagation modes can be studied, including modes such as back-scatter meteor trails, and, at suitable solar times, high M.U.F. propagation. As this band is not yet universally available for the Amateur Service, listening stations can play an important role here!

b) VHF Managers/Contest Committees etc. should be aware of the possibility of using contest logs for the derivation of data useful for scientific studies. These logs often contain a wealth of data covering a wide geographical area, providing detailed information, particularly on tropospheric propagation, that could not be obtained in any other way. This is an excellent illustration of the main strength of the Amateur Service: the mass of observation stations!

Reporting forms (log sheets), used in the various projects and showing the data that preferably should be gathered by the participants, as well as the necessary information and instructions are obtainable from the addresses given above.

Some reporting forms already in use are appended to this section, together with some examples of information sheets accompanying these reporting forms.

7. Cooperation with the DUBUS magazine

In order to facilitate the flow of information from amateurs to the coordinators a cooperation with DUBUS has been arranged in 1995 whereby the relvant DUBUS editors will share the information received with the IARU Region 1 coordinators.

8. Propagation database

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

Appendix Sample reporting forms and information sheets (nov 96)

7 OPERATING PROCEDURES

7.1 Minimum Requirement for a valid QSO (Vienna 2007)

A definition for a valid QSO on VHF and on higher bands is:-

A valid contact is one where both operators during the contact have

(1) mutually identified each other
(2) received a report, and
(3) received a confirmation of the successful identification and the reception of the report.

It is emphasized that the responsibility always lies with the operator for the integrity of the contact.

7.2 Weak-signal QSO procedure

Terrestrial signals may often be heard on the VHF bands that are weak and suffering from considerable fading. It will be helpful in these circumstances to be able to resort to an operating procedure that maximises the possibility of a contact.

The procedure described here is primarily for CW and SSB contacts although the principle may be adapted for other communication techniques if required.

The Basis of the Procedure
Imagine that two stations can hear each other but signals are very weak and suffering from considerable fading. This is often experienced on the 50MHz, 70MHz and 144MHz bands during poor tropospheric propagation conditions.

These two stations may attempt to contact each other but can often be transmitting (or receiving) at the same time. Therefore the QSO is most likely to fail. Somehow you need to be able to drop into a timed period mode to enhance the chance of making a QSO.

But which station starts the first timed period?

This may simply be achieved from the way you are beaming your directional antenna.

So, for example, if you hear a station when you are beaming WEST (or NORTH) and *hopefully* the other station is beaming EAST (or SOUTH) then both stations can drop into a timed sequence because they will know approximately where the other station is.

Procedure
The weak-signal QSO procedure commences by ascertaining from your beam-heading which station starts the first 1-minute period.

If you are beaming SOUTH or EAST you start the first (even) 1-minute period.
For example: 00-01, 02-03, 04-05 ……. and so on 54-55, 56-57, 58-59….

If you are beaming NORTH or WEST you start in the second (odd) 1-minute period.
For example: 01-02, 03-04, 05-06 ……. and so on 55-56, 57-58, 59-60….

Stations alternately call each other until signals are heard.

QRZ G4ASR ... QRZ G4ASR ... OVER (or K on CW)

When the call sign of the calling station is heard insert a conventional tropo report (3 times)

F6ETI G4ASR 52 52 52 ... F6ETI G4ASR 52 52 52 ... OVER (K)

Reply with a confirmation roger report (3 times)

G4ASR F6ETI R57 R57 R57 ... G4ASR F6ETI R57 R57 R57 ... OVER (K)

Confirm with a string of rogers (3 times)

F6ETI G4ASR Roger Roger Roger ... OVER (K)

G4ASR F6ETI Roger Roger Roger ... OVER (K)

Valid Contacts
A valid contact is one where each operator has copied both call signs, the report and a confirmation that the other operator has done the same. This confirmation may either be an "R" preceding the report or a string of three consecutive "rogers" (RRR).

This procedure may also be used for contest contacts by inserting the appropriate contest exchange requirements within the 1-minute periods.

7.3 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.

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

7.4.1 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.

7.4.2 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.

7.4.3 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.

7.4.4 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.

7.4.5 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.

7.4.6 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.

7.4.7 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.

7.4.8 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):

Band	Duration
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".

7.4.9 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.

7.4.10 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).

7.5 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

7.6 QSO Procedure for Airplane Reflections

Airplane Reflections is the process of reflecting radio waves off the body of an aircraft in flight. Contacts may be made on any of the UHF or Microwaves bands with distances up to 800 kilometres or so away. (*The higher the frequency , the shorter the time you have.)*

As the available time for a QSO in this propagation mode is very brief, usually less than one minute, we need an operating procedure in order to speed up the information exchange.

The scheme (not the reporting system) for the “old” MS procedure seems like a suitable model for this purpose. This procedure is primarily for CW and SSB contacts but may be adapted for other communication modes if required.

Calling
The contact starts with one station calling randomly (CQ), - or in a scheduled QSO: Calling the other station by sending both call signs. A calling sequence should be kept as short as possible.

Reporting system
The report is the standard RS(T) reporting system: 59 or 599.

Reporting procedure
A report is sent when the operator has positive evidence of having received the correspondent's or his own callsign or parts of them. The report should be sent at least 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.

Confirmation procedure
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, 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.

When one operator receives a confirmation message, such as "R57", 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.

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".

CT08_C5_12 EDR QSP procedure for airplane reflections 1

And in practice:
If you start calling CQ:
CQ G4ASR …CQ G4ASR … CQ G4ASR … BREAK (or K on CW)

Or starting a scheduled QSO:
SM7ECM G4ASR... BREAK (or K on CW)

When signals are heard insert a conventional tropo report (usually 2 - 3 times)
SM7ECM G4ASR 52 52 52... BREAK (K)

Reply with a confirmation roger report (usually 2 - 3 times)
[G4ASR SM7ECM] R57 R57 R57 ... BREAK (K)

Confirm with a string of rogers (usually 3 times)
[SM7ECM G4ASR] Roger Roger Roger...BREAK (K)
[G4ASR SM7ECM] Roger Roger Roger...BREAK (K)

Usually QSOs made via Airplane reflections is conducted on random frequencies. As a consequence the callsigns could be eliminated when first copied correctly. For contest purposes you have to add the contest exchange i.e. the Locator.

7.7 AMATEUR-SATELLITE OPERATING PRACTICE

(Adopted at the IARU Region I Conference in Warsaw, 1975)

1. Region I member societies accept the instructions published by the sponsors of amateur -satellites like e.g. AMSAT as regards the times for operation, output powers that may be employed and the way of operating through the amateur-satellite, including adherence to the published satellite bandplan.

2. All possible publicity should be given to satellite bandplans, operating schedules, power limitations on ground stations etc., together with advice on the necessity of receiver improvement via low-noise pre-amplifiers and, where applicable, low-angle antennas, in order to enable operators to monitor their own and other downlink transmissions satisfactorily, thus ensuring that:

    a. no transmission is started on a frequency already in use

    b. interference due to doppler effect frequency shift is avoided

    c. blocking caused by own transmissions can be identified and output power can be reduced

    d. other stations calling can be heard and identified.

3. Amateur-satellite users should be encouraged to:

    a. refrain from transmitting unless they can monitor their own signals

    b. strictly adhere to the satellite bandplan with their modes of transmission

    c. avoid long calls and slow operation

d. refrain from operating during times reserved for specific purposes like scientific experiments, as published by the satellite sponsors.

4. National societies should supervise the implementation of the above recommendations, and take appropriate action against persistent offenders.

The above recommendations were re-confirmed and strengthened at the IARU Region I Conference in Miskolc-Tapolca (1978), where the following resolution was adopted:

> Publicity, preferably on an annual basis, should be given to the correct ethics and practices for satellite operation. National societies should investigate the possibility of setting up monitoring stations for the amateur-satellite service, in order to be able to take direct action against operators who do not observe the internationally agreed operating rules. It is recommended that national societies

a) write to offending amateurs in their own country (society members as well as non-society members) pointing out the correct behaviour and operating practice expected from them;

b) report directly to other member societies any infringements of the established rules occurring in their country.

At the IARU Region 1 Conference in Tel Aviv 1996 it wasw decided that for a trial period the IARU Region 1 Monitoring System coordinator should not limit his activities to the bands below 30 MHz but take care as well, together with the national monitoring system coordinators and national satellite coordinators, of intruders in the input channels of satellite transponders. This activity might be rather complex as even the 145 MHz band is not exclusively for amateurs in some countries and the other satellite allocations have a secondary status in most countries.
But the **VHF Managers** shall pay a lot of attention to this activity as the growing problem of intruders in satellite inputs is becoming a serious nuisance.

7.8 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.

7.9 Definition of a complete contact (deleted)

7.10 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.

7.11 CONCERNING GUIDELINES FOR PACKET RADIO

RESOLUTION 91-2

The IARU Admninstrative Council, Bandung, October 1991,

considering the growing popularity of packet radio for the relaying of messages between radio amateurs,

recognizing that a medium as effective as packet radio can invite abuse through the introduction of traffic that is inappropriate to the Amateur Service internationally,

noting Resolution 87-2 (revised 1989) which urges adherence to the spirit and intentions of the ITU Radio Regulations in handling traffic, and calls attention to the undesirable aspects of the uncontrolled proliferation of unattended store-and-forward "mailbox" stations,

resolves that the attached "Guidelines for Packet Radio Operators" and "Guidelines for Packet Radio Bulletin Board Operators" first adopted at the Region 3 Conference, Bandung, October 1991, shall be distributed to IARU member-societies worldwide with the request that they be shared with the amateurs of each country, and

further resolves that future IARU regional conferences are invited to suggest improvements to these guidelines so they will continue to be representative of good amateur radio operating practices as these practices evolve over time.

7.11.1 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.

7.11.2 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.

7.11.3 CONCERNING GUIDELINES FOR APRS

Based on Cavtat 2008 recommendation CT08_C5_Rec13, IARU Region-1 is to adopt the APRS "New n-N Paradigm", as published by WB4APR

By simplifying the network to only accept "WIDEn-N", and telling users to limit their "N's" to the minimum needed for their own area, a vast improvement in reliability and throughput will be achieved in a common IARU, Region 1 APRS System, and beyond.

ON6TI is to draw up a form of words that will detail this further in a future edition of the VHF Managers' Handbook

8 Technical Recommendations of IARU Region 1

8.1 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.

8.2 FREQUENCY MODULATED TELEPHONY

8.2.1 The basic FM 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 FM 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 FM as well.

In order for an efficient use of FM 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 FM has almost disappeared (it still is used with rain-scatter on the microwaves) and the majority of amateurs use crystal-controlled FM 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 FM 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.

8.2.2 FM Repeaters (Recommendation FM.2.)

At the 1972 Conference in Scheveningen a recommendation was worded for the then appearing FM 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.

8.3 DIGITAL TRANSMISSION

8.3.1 Data-transmission (Recommendations D.1.1. and D.1.2.) - removed

8.3.2 Digital telephony (Recommendation D.2.) (removed DAVOS 2005)

8.4 AMATEUR (wide band) TELEVISION

8.4.1 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.

8.4.2 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.

8.4.3 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.

8.5 FACSIMILE (Recommendation V.3)

At the 1978 Conference in Miscolc-Tapolca a standard for facsimile was adopted, based upon wide-spread practice on HF and VHF . Frequency modulation with a "shift" of 800 Hz is the basic modulation method, but above 144.5 MHz a compound modulation (FM/AFM with the audio FM between 1500 and 2300 Hz) is permitted. The implication is that with (preferred) FM the channel bandwidth required is in the order of 1 kHz but that for the same type of transmission some 12 kHz bandwidth is used for FM/AFM on 145 MHz. The 1978 standard is not complete, but no society has since proposed additions. In practice "slow-scan" ATV transmissions use the same basic standard.

8.6 REPORTING

8.6.1 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 propgation 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.

8.6.2 The RSQ (Readability Strength Quality) reporting scale for digital modes:

Where applicable RSQ reporting may be used for digital modes

Readability (% of text)
R5 95%+ Perfectly readable
R4 80% Practically no difficulty, occasional missed characters
R3 40% Considerable difficulty, many missed characters
R2 20% Occasional words distinguishable
R1 0% Undecipherable

Strength
S9 Very strong trace
S7 Strong trace
S5 Moderate trace
S3 Weak trace
S1 Barely perceptible trace

Quality
Q9 Clean signal, no visible sidebar pairs
Q7 One barely visible pair
Q5 One easily visible pair
Q3 Multiple visible pairs
Q1 Splatter over much of the spectrum

8.6.3 The MOS (Mean Opinion Score) reporting scale for digitized speech:

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

Notes:
Non-integer MOS scores like 3.5 are possible. An MOS of 3.0 is generally referred to as toll quality, meaning good enough to pay for. Digital voice users may tolerate MOS levels less than three if they get additional benefits, such as simultaneous voice and data services.

While evaluation of voice systems may be made based on test-bench measurements, they must ultimately relate to the perception of the listener. A large body of voice-system evaluations exists based on MOS. Comparisons among systems are therefore readily made. MOS relates well to the readability figures commonly used in Amateur Radio signal reports.

8.7 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 FM 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.

8.8 IARU Region 1 Technical Recommendations

8.8.1 IARU Region 1 Technical Recommendation D.1.1

WARSAW 1975,CEFALU 1984

GENERAL RTTY STANDARD

The RTTY signalling speed to be 45.45 bit/s. The use of a higher speed than 50 bit/s is not considered appriate at this time,

The RTTY transmission mode to be FSK on all bands with a preferred shift of 170 MHz on the bands below 30 MHz an 170 or 850 Hz above 30 MHz. The mark signal shall be the higher radiated frequency,

Reception of RTTY by means of a two-tone system is encouraged for optimum communications effectiveness,

In the interests of bandwidth efficiency and communications effectiveness AFSK operation on AM transmitters is not encourgaded. Were AFSK operation is used on VHF-UHF for local and autstart communications the use of FM transmitters is strongly encouraged. In the interests of bandwidth efficiency the use of a standard AFSK shift of 170 Hz is recommended. In this case the standard AFSK tones should be 1275 Hz "space" and 1445 HZ "mark". If 850 Hz shift is used the "mark" frequency should be 2125 Hz.

AMTOR/RTTY STANDARD

All IARU member societies shall adopt CCIR 476-1 in both modes "A" and "B" and Region 1 shall be asked to liaise with Regions 2 and 3 so that AMTOR may become a truly international standard

A speed of 45.45 bit/s is currently recommended , however speeds op 50, 75 and 100 bit/s should be encouraged

Each society - only where such requirements still exist- should press their respective licensing authorities to remove the requirement for "dual indentification " when using the international standard CCITT number 2 code

The minimum specification for the signalling format should be 1 start bit, 7 data bits, 1 parity bit, 1 stop bit. The parity should be as follows :

if generated	even parity
if not generated	parity bit set to space.

8.8.2 IARU Region 1 Technical Recommendation D.1.2

NOORDWIJKERHOUT 1987

STANDARDS FOR DIGITAL COMMUNICATIONS

1. Modulation methods

- FM/AFSK (where allowed in the bandplans)
- FSK : at speeds below 300 bit/s FSK is preferred
- PSK : at speeds above 300 bit/s PSK is preferred

General Applications :

Shifts for FSK and FM/AFSK :

at 1200 bits per second	-1 kHz
below 1200 bits per second	-850 Hz, 170 Hz (preferred)

Mark is always the higher frequency.

Note. For FM/AFSK the audio frequencies are :
- space 1275 Hz
- mark 1445 Hz or 2125 Hz, depending on shift

Packet-Radio Applications: [1])

for 300 bit/s transmissions using FSK a shift of 200 Hz should be used;

for 1200 bit/s transmissions using FM/AFSK audio frequencies of 1200 and 2200 Hz should be used (as in the Bell 202 standard).

On the bands below 30 MHz the signalling speed shall not be more than 300 bit/s.

2. Coding/bit- rates [2])

- Baudot : 45.45, 50, 100 bits per second (50 bit/s preferred)

- ASCII : 1 start bit, 7 data bits, 1 parity bit, 1 stop bit.
  Parity: if generated - even parity
  if not generated - parity bit set to space

  110 bits per second preferred.

3. Protocols

- Packet Radio : AX-25 as published by ARRL

- AMTOR : CCIR 476-1, modes A and/or B.

[2] Packet-Radio : It is recognised that in the future higher data rates will be achievable through the use of different modulation methods. It is recommended, however, that in all cases for the frequencies used for communication between the user and a network access point the bandwidth should not exceed 12 kHz. For links between packet-radio nodes higher data rates and larger bandwidths may be used. For such high speed links (greater than 1200 bit/s) FM/AFSK is not preferred

8.8.3 IARU Region 1 Technical Recommendation FM.1

BRUSSELS 1969, SCHEVENINGEN 1972

A. TECHNICAL STANDARD FOR NARROW BAND FM

For FM 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 FM 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.

8.8.4 IARU Region 1 Technical Recommendation FM.2

TECHNICAL STANDARDS FOR FM 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. To minimise mutual unwanted interference, all FM repeaters will incorporate CTCSS tones on receivers as well as on transmitters. The transition period ends by the end of 2014.
For CTCSS the frequencies listed in table FM2.1 shall be adopted as a standard so that compatibility between repeater systems in different countries can be maintained, aiding the traveller who moves between countries.(The frequencies shall be accurate ∀ 1%)
~~The CTCSS frequencies shall be allocated by member societies to their country's repeaters. The reference letters shown in the table may be used to identify CTCSS frequencies in a compact way.~~

11. DTMF: The DTMF system as specified below can be used as an alternative to the control of repeaters, voice mail boxes etc.
The hardware part of the DTMF system consists of a keyboard with 12 push-buttons using the symbols #,*,A,B,C,D and figures from 0 to 9. When pressed each push-button will activate 2 tones simultaneously, one above, the other below 1000 Hz, according to the following scheme in table FM.2.2.
For example, if No. 5 is pressed, the tone combination 770 Hz/1336 Hz will be the result.
The tone frequencies have to be accurate within ∀ 1.5 % .
Each tone burst should be betwen 65 and 105 msec long. The pause between tones should be at least 200 msec.

12. User functions: To control the basic functions of repeaters and voice-mailboxes, the following codes should be used :
Basic commands :
* Repeater opens, (like the 1750 Hz)
* + 0 Repeater opens and transmits callsign, location and - if necessary- the CTCSS tone.
* + 1..9 Additional functions (squelch control, power level and others)
These basic commands can be extended and it is possible to control special functions of the repeaters or voice-mailboxes

CTCSS FREQUENCIES IN Hz TO BE USED FOR REPEATER ACCESS			
67,0	94.8	131.8	186.2
71.9	100.0	141.3	203.5
74.4	103.5	146.2	210.7
77.0	107.2	151.4	218.1
79.7	110.9	156.7	225.7
82.5	114.8	162.2	233.6
85.4	118.8	167.9	241.8
88.5	123.0	173.8	250.3
91.5	127.3	179.9	

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.

8.8.5 IARU region 1 Technical Recommendation P.1

LAUSANNE1953,CEFALU 1984,TEL AVIV 1996

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. FM Repeater aerials

   Vertical (see recommendation FM.2.)

8.8.6 IARU Region 1 Technical Recommendation S-METER READINGS

BRIGHTON 1981, TORREMOLINOS 1990

STANDARDISATION OF S-METER READINGS

1. One S-unit corresponds to a signal level difference of 6 dB,

2. On the bands below 30 MHz a meter deviation of S-9 corresponds to an available power of -73 dBm from a continuous wave signal generator connected to the receiver input terminals,

3. On the bands above 30 MHz this available power shall be -93 dBm,

s4. 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.

8.8.7 IARU Region 1 Technical Recommendation TONE REPORTS

Vienna 2010

TONE REPORTS

In order to give an indication of distorted tonal quality due to special propagation modes, the 1-9 scale of the Tonality (T) component of the RST reporting system will be extended with the following:

"a" For signals distorted by auroral propagation
"s" For signals distorted by scatter propagation mechanisms
"m" for signals distorted by multipath propagation.

For example:-

599 - Good signal
58a - Fairly good Signal via Aurora
59s - Good signal via Scatter (e.g. Rainscatter)

Footnotes

1. Other letters may be defined in future should the need arise
2. This alternative system may be used for any mode e.g. CW, SSB, MGM etc

8.8.8 IARU Region 1 Technical Recommendation 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.

8.8.9 IARU REGION 1 TECHNICAL RECOMMENDATION SATV

WARSAW1975

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 FM 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.

8.8.10 IARU Region 1 Technical Recommendation V.2

LILLEHAMMER1999,TORREMOLINOS 1991

STANDARDS FOR MICROWAVE FM ATV		
	> 1 Ghz < 24 GHz	> 24 GHz
Mode of emission:	F5/F3	F5/F3
Video bandwidth (3 dB):	5 MHz	5 MHz
Pre-emphasis:	CCIR rec 405.1	CCIR Rec 405.1
Colour sub-carrier frequency:	4.433618 MHz	4.433618 MHz
Maximum instant. mod. index:	-	.05
Peak dev.(with pre-emphasis):	3.5 MHz	3.5 MHz
Channel bandwidth:	12 MHz at -40 dB 18 MHz at -50 dB	12 MHz at -40 dB
Sound sub-carrier frequency:	5.5 MHz	5.5 or 6 MHz
Sound sub-carrier amplitude (with respect to peak video):	-	-14 dB
Sound sub-carrier modulation index:	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.

8.8.11 IARU Region 1 Technical Recommendation V.3

MISKOLC-TAPOLCA 1978

FACSIMILE STANDARDS

For facsimile transmissions in the Amateur Service the following characteristic values are preferred:

1. The video (picture) modulated signal is generated at the audio frequency level, similar to the technique used for SSTV. The edge frequencies for "black" and "white" are 1500 Hz and 2300 Hz respectively ; the frequencies corresponding to the half-tones are between these two frequencies. The audio frequency bandwidth is maximally 3000 Hz.

2. The rotation speed of the picture drum is switchable between 60, 90, 120, 150, 180 and 240 rpm, with 60, 120, 180 and 240 rpm being the preferred values.

3. The index of co-operation shall provisionally be 288, in accordance with CCIR recommendation. Minor deviations from this value are permissable.

4. Phasing-in signals and end-of-picture signals will be chosen at a later stage, taking into account practical considerations based on the state-of-the-art.

5. All Amateur Service allocations should be open for this mode of transmission. Operation via repeaters and amateur satellites should also be allowed.

6. For the transmissions F1C should be used. (e.g. frequency shift keying of an audio frequency sub-carrier, which modulates the main carrier in SSB, or direct FSK (shift-keying) of the main carrier by the modulating signal.)
   Additionally, on frequencies above 144.5 MHz mode F2C, i.e. FM/AFSK modulation of the RF carrier by a frequency-modulated sub-carrier, is permitted.

9 Amateur Satellites

9.1 Introduction

The Amateur Satellite Service is a radiocommunications service using spaceborne radio equipment for the same purposes as the Amateur Service. This includes amateur communications by earth orbiting satellites, interplanetary missions and contacts with astronauts on the International Space Station.

Starting with the launch of Oscar-1 in 1961, amateur satellites have become increasingly sophisticated. They have provided voice and data links, served school science groups, provided emergency communications, acted as technology demonstrators, and transmitted Earth images. Construction and operation of any amateur satellite is subject to a range of ITU, IARU and other regulatory and coordination procedures.

9.2 IARU Region 1 and IARU Satellite Coordination

Satellite builders should make certain that their operating frequencies are coordinated to ensure that mutual interference between different spacecraft does not occur. More information about this process can be found here: http://www.iaru.org/satellite/

National VHF/Microwave Managers and Amsat organisations are encouraged to closely coordinate activities and monitor developments in their countries so that, for example, Cubesat projects are fully coordinated. Advice is available from IARU Satellite Advisors and Coordinators.

9.3 Amateur Satellite Names

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.

A nomenclature has been 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. 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.

The OSCAR designation is administered by Amsat-NA not IARU. There is no requirement for an OSCAR number to be assigned to an amateur satellite in order for it to be legitimately recognised and used in the amateur satellite service. However OSCAR numbers are a proud tradition of amateur radio that should be supported and continued.

9.4 Amateur Satellite Band Plan Usage

In IARU Region 1 band plans the following frequency segments are designated for use by satellites:-

145.800 - 146.000 MHz (out of the overall 144-146MHz ITU allocation)
435.000 - 438.000 MHz
1260 - 1270 MHz (uplink only)
2400 - 2450 MHz
3400 - 3410 MHz (only available in a few Region 1 countries)
5650 - 5670 MHz (uplink only)
5830 - 5850 MHz (downlink only)

10.450 - 10.500 GHz
24.000 - 24.050 GHz
47.000 - 47.200 GHz
76.000 - 81.000 GHz
134.00 - 136.00 GHz
136.00 - 141.00 GHz
241.000 - 248.00 GHz
248.000 - 250.00 GHz

9.5 Satellite Transponder Designations

Apart from beacons and telemetry transmissions, amateur satellites often carry transponders. There are two methods of designating operation modes and frequencies. The original method specified by operational mode type was 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

More recently a more flexible alternative method has been developed where the input (uplink) is always specified first. A slash is used to separate input and output:-.

Band	Wavelength	Designator
21MHz	15m	H
29MHz	10m	T
144MHz	2m	V
435MHz	70cm	U
1260MHz	24cm	L
2400MHz	13cm	S
5650MHz	6cm	C
10GHz	3cm	X
24GHz	1.5cm	K

When this newer method is used for transponder modes, the older designations become:-

Old Name	New Name
A	V/T
B	U/V
J	V/U
K	H/T
KA	H,V/T
KT	H/T,V
L	L/U
S	U/S
T	H/V

9.6 ITU Notification Requirements for Amateur Satellites

Background

In recent years there has been a dramatic increase in the number of satellites being launched which operate on frequencies in the Amateur Satellite Service.

The Amateur Satellite Service has different and less onerous notification and registration requirements than most other Satellite services. However it has been noted that many satellites have not actually been notified to the ITU at all. This has led to their records of frequency usage, which are often examined by other services, providing an incomplete picture to our possible detriment. This section shows the correct procedure which should be followed for all such projects.

It should be noted that this ITU procedure should proceed in parallel with the IARU Frequency Coordination process which is still required. All member societies are requested to familiarise themselves with this procedure and to encourage/ensure that satellite builders in their country follow the process.

Procedure

The Potential Amateur Satellite Builder

- A potential amateur satellite builder is required to inform their National Telecommunications Regulatory Authority about their planned satellite project.

The Regulatory Authority

- Verifies that the project is in accordance of Article-25 and other provision of the Radio Regulations (RR)
- Checks if the satellite, telemetry and command ground station(s) will be operating under valid amateur licenses
- In cooperation with the responsible amateur licence holder, submits the required API (Advanced Publication Information) information to the ITU (Bureau) – see the required data in the wizard at:

  http://www.itu.int/ITU-R/space/support/ARS/ARS-APIhelp.pdf

  It is only necessary to send general orbital characteristics, frequency bands (not exact frequencies), emissions, service area, antenna diagrams and some other data – see the wizard.
- The Bureau will publish, based on the API data from the Regulatory Authority, an API/A special section to inform all administrations about the project
- At the same time (as submitting the API to the Bureau), or preferably earlier, the responsible amateur license holder should contact the IARU Satellite Adviser and submit all required information for the IARU amateur satellite frequency coordination process. See the information at http://www.iaru.org/satellite/

- The National Regulatory Authority (with help of the Bureau) has to solve any API potential problems (for example exclusion of country from the service area of the satellite) and the Bureau will publish it in API/B publication.
- When the IARU amateur satellite frequency coordination is completed the IARU Satellite Frequency Coordinator informs the responsible amateur license holder of the coordinated frequencies and some other (if necessary) conditions/restrictions.
- If all is in order, the National Regulatory Authority, in cooperation with the Satellite builder, submits the required notification data to the Bureau using SpaceCap software (see CR/303 for details) – more detailed data, including EXACT frequency assignments (notification wizard is under preparation)
- The Satellite has to be operational within 7 years from the date of the receipt of the API information. Notification shall reach the Bureau not earlier than 3 years before the satellite is operational. The Bureau will publish, based on the notification data, a PART I-S publication – acknowledgment
- The Bureau will publish the result, in its technical and regulatory examinations and findings, in PART II-S publication – resulting in INTERNATIONAL RECOGNITION and RECORDING of the satellite in the Space Master Register following all regulatory requirements of the Radio Regulations

9.7 IARU-AC RESOLUTION 89-3 - CONCERNING AMATEUR SATELLITE USAGE

The IARU Administrative Council, Orlando, September 1989, recognised the important contributions made by amateur societies in the following areas:

- demonstration to the professional community that radio amateurs contribute to the development of state-of-the-art technology and techniques

- provision of new and challenging operational opportunities and training ground for radio amateurs to acquire new skills

- providing opportunities for training in an exciting technological field by direct participation, in schools, universities and professional organisations, and

- 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:

- the encouragement of a wide dynamic range of activities stimulating training through increasing intellectual challenge

- the stimulation of young people in schools and universities to develop an interest in amateur radio through participation in amateur satellite activities

- where allowed, the provision of emergency services, especially to parts of the world that are less technologically developed, and

- 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 resolved that:

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 worldwide.

3) Operational frequencies of amateur satellites shall be in accordance with all applicable IARU band plans

4) The use of higher frequency bands by amateur satellites shall be encouraged.

9.8 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.

9.9 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 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: Maintain a data base of all operating and planned satellites on Amateur Frequencies including frequencies, emissions and orbits.

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.

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.

Promptly provide all information required by the ISA.

After taking into account the input from various 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.

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.

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.

It is also important that the role of the IAFC is not confused with that of the ISA. To this end:-

- 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.
- The IAFC shall promptly inform the ISA of any matters that may affect bands allocated to the amateur services, particularly the amateur satellite service.
- 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.
- 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.

9.10 RELEVANT IARU REGION-1 RECOMMENDATIONS

Recommendation CT08_C5_Rec01
(Paper CT08_C5_03 Support for Satellite Frequency Coordination)
Member Societies are recommended to work closely with the IARU Satellite Adviser and his Advisory Panel, and with their national administrations, with respect to requests for satellite frequency coordination originating in their respective countries,

Recommendation CT08_C5_Rec02
(Paper CT08_C5_03 Support for Satellite Frequency Coordination)

Member Societies are recommended to promote the proper use of amateur frequencies consistent with the international Radio Regulations, with a view toward maintaining the integrity of the amateur service and its frequency.

Recommendation CT08_C5_Rec22
(Paper CT08_C5_16 Increased Amateur Satellite Service 2 Metre Usage)
The presence of interfering non-amateur signals in the 145.80-146.00MHz part of this band, in many parts of the world, is well documented. To prevent the retransmission of interfering terrestrial signals, satellites in the Amateur Satellite Service that plan to use the 145MHz Amateur band for transponders, are encouraged to use this band for downlink (satellite to ground) modes only, regardless of modulation type

Recommendation CT08_C5_Rec25
(Paper CT08_C5_17 3400MHz Amateur Satellite Allocation)

1) National Societies should take all necessary steps in seeking 3400-3410MHz allocations on a Secondary non-interference basis as quickly as possible.
2) All Societies should explicitly include the Amateur Satellite Service (both S-E and E-S) in such requests on the basis that many years of terrestrial and EME operations (notably in the CEPT area) have not resulted in interference reports from other users.
3) National Societies and IARU–R1 should collaborate more closely to assist those Societies who in the past have not been able to achieve such allocations.
4) Societies should collectively obtain a critical mass of national allocations so that footnotes in regional allocation tables can be extended or acquired that include the Amateur Satellite Service
5) IARU-R1 to prioritise this band and to take active steps in support of these goals

Recommendation CT08_C5_Rec37
(Paper CT08_C5_37 Amateur Satellite Service Spectrum - Vienna 2007)
It is recommended that all IARU Region 1 societies request that the following additional Amateur Satellite Service bands be studied and considered, perhaps as a package, for a future WRC agenda item:-

50-51 MHz
1240-1250 MHz
2300-2330 MHz
2390-2400 MHz
3400-3410 MHz
5650-5670 MHz (Currently Earth-To-Space only)
10350-10400 MHz

9.11 Historical Overview of Amateur Satellite Developments

For up to date information visit:

http://www.amsat.org/amsat-new/satellites/

9.12 Amateur Satellite Organisations

For up to date information visit:

http://www.amsat.org/amsat-new/links/index.php

9.13 Current Satellites

For current operational information check these sites:

http://www.amsat.org/amsat-new/satellites/status.php
http://www.dk3wn.info/satellites.shtml
http://oscar.dcarr.org/

10 REPEATERS

10.1 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.) .

10.2 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)

11 Beacons

11.1 IARU REGION 1 VHF / UHF BEACONS A GUIDE TO GOOD PRACTICE

Beacon transmitters have long been used to indicate the presence of VHF openings and have contributed significantly to our knowledge of propagation. As the numbers of beacons 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.

Beacon - A station in the Amateur Service or Amateur-Satellite Service that autonomously transmits in a defined format, which may include repetitive data or information, for the study of propagation, determination of frequency or bearing or for other experimental purposes including construction."

It is not intended that this document should specify the exact purpose of any individual 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/Microwave beacons for propagation monitoring purposes, as designated by the beacon sections of the bandplans.

11.1.1 CO-ORDINATION PROCEDURE.

The existing requirement for co-ordination of regional beacons will be retained. For non-coordinated beacons the beacon proposal should be agreed with the national society (with consultation with neighbouring societies where appropriate) and a provisional frequency chosen.

.

If the beacon has an ERP of greater than 10W then the frequency should be submitted to the IARU Region 1 VHF beacon co-ordinator to check for potential interference problems. Societies should provide regular and frequent updates to the IARU R1 Beacon coordinator. Beacons or changes to beacons which are not notified to the coordinator forfeit their arbitration rights in any coordination dispute.

11.1.2 Local Beacons:

In the microwave bands, local beacons, which should be 10W ERP max, may preferably be placed in the x.750-x.800MHz range of the relevant narrowband segment, adjacent to, but outside of the exclusive propagation beacon segments. In this range, the lower powers will permit greater frequency reuse. This permits traditional propagation beacon frequencies to be used more efficiently and minimise cases of local/mutual interference. National societies should inform the IARU R1 Beacon coordinator of such local beacons and national bandplan use.

11.1.3 TRANSMISSION MODE

Amplitude or Frequency shift keying (A1A or F1A) may be used according to the scheme below. The beacon radiates on its nominal frequency during the period where no information is transmitted. It then moves to "space", 250/400Hz below and then keys back to nominal (“mark") while transmitting its information. In this way the transmission sounds like A1A in a SSB receiver set to receive USB.

11.1.4 FREQUENCY SPACING

All coordinated and notified beacons should operate within the beacon segment of the band plan and be on a frequency which is in accordance to the table below. In bands above 1.3GHz, half the frequency spacing defined below be used as an offset in frequency coordination disputes (Vienna 2007).

Should MGM also be used by a beacon, the nominal MGM tone (eg for sync, JT4 tone-0 etc), should be exactly as per the nominal carrier frequency

Band	50 MHz	70 MHz	145 MHz	435 MHz	1.3 GHz	2,4 to 10GHz	24 to 47 GHz
Frequency ppm Tolerance Hz	4 200	2.8 200	1.4 200	1.0 400	0.8 1000	TBA	TBA
Spacing between beacons - kHz	1	1	1	1	2-3kHz	5kHz	10kHz
F1A Frequency shift - Hz	250	250	400	400	400	400	400
Frequency at "space" - Hz	nominal - 250	nominal - 250	nominal - 400	nominal - 400	nominal - 400	nominal -400	nominal -400

TBA = To Be Agreed at a future conference

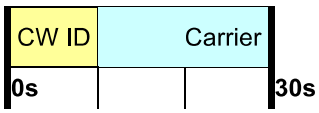
11.1.5 BEACON MESSAGE

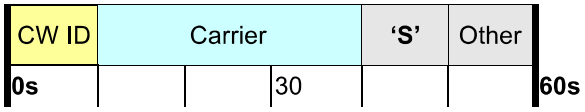
As beacons are often heard at very low signal levels, together with spurious signals, it is important the message is simple, unambiguous and repeated frequently. It is also necessary to have a period without information ("carrier") for frequency checking purposes and signal strength measurement; and also to make it easy to distinguish the frequency when using F1A.

1. For a coordinated beacon, the only essential information in the beacon message is the callsign. The locator or other information is not essential
2. The callsign should be sent in plain CW at least once per minute, not exceeding 60 characters per minute
3. Beacons should include a period of plain carrier of approximately 20-30s, sufficient for frequency checking purposes.
4. For mixed mode beacons, the MGM mode should start on the even minute, whilst the odd minute includes the plain carrier period. Effort should be made to ensure good timing accuracy of the even/odd minutes.
5. It may be helpful to indicate a forthcoming change of mode by a short CW symbol (such as an 'S' or 'X')
6. For beacons that are MGM only (which should only be exceptions to the other recommendations) then the message should be MGM at the start, followed by the CW ID within a minute period.

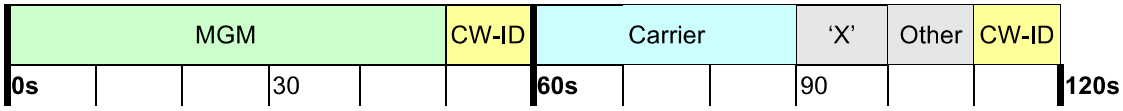
Examples of these (with approximate message lengths) are illustrated below:-

Simple 30 & 60 second Messages

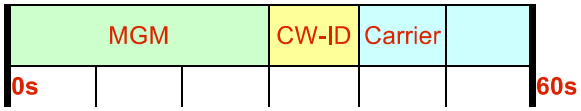




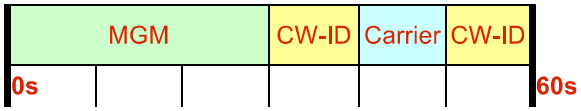
MGM Mixed Mode



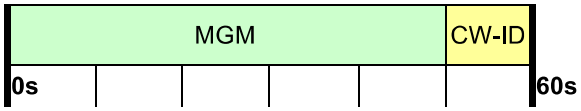
MGM Mixed Mode



MGM Mixed Mode



MGM



11.1.6 OPERATION

- Operation should be 24 hour continuous.
- If beacons change parameters during the transmission this must be reflected in the message transmitted.
- IARU Region-1 encourages best practice for both timing/frequency accuracy and phase noise to enhance general performance for the benefit of all.
- That development of new modes optimised for beacons are encouraged, which may either enhance DX reception or permit more efficient equipment (and thus lower electricity costs) to enhance sustainability
- That National Societies and IARU-R1 coordinators be kept updated on such developments.

11.1.7 STATUS

It is important that the operational parameters and the status of each beacon are widely known. The information should be sent to the IARU Region 1 VHF beacon coordinator via the local beacon coordinator or spectrum manager at least once per annum or when the operational parameters are changed to ensure that the IARU Region 1 beacon list is up to date.

11.2 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.

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

This list of VHF/UHF Beacons is compiled for IARU Region 1 by G0RDI, 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
24 Acres End
Amersham
Buckinghamshire HP7 9DZ England

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

The list is also posted on the RSGB web site at

http://data.dcc.rsgb.org

12 VHF/UHF/Microwaves RECORDS

The desirability of having a list of national and international records on VHF, UHF, and MICROWAVES, which would give a good impression of the progress made by amateurs in the course of the years, has been recognized for a long time. At the meeting of the VHF Working Group in Amsterdam (1976) SM5AGM, Folke Rasvall, then VHF Manager of SSA, offered to compile an IARU Region I record table for the different modes of wave propagation. This offer was accepted with thanks, and it was agreed that:

> a) VHF Managers shall send SM5AGM a list of their national DX records, covering the various modes of propagation, i.e. tropospheric, aurora, meteor scatter, sporadic-E and EME, for each of the VHF, UHF and Microwaves bands; b) the information, after having been collated by SM5AGM, shall be sent to the Hon. Secretary of IARU Region I for publication in the Region I News, e.g. once per annum; c) the VHF Manager shall sent the information on any new record established in his country immediately to SM5AGM.

The following recommendation was adopted at the IARU Region I Conference in Opatija (1966):

> In principle all QSO's via a translator system shall be in a special class and shall not be eligible for inclusion in normal Countries Worked lists or for DX-record awards. A special list for translator QSO's shall be established.

At the IARU Region I Conference in Cefalu (1984) SM5AGM was nominated as IARU Region I Coordinator for VHF/UHF/Microwaves DX records. SM5AGM made the following suggestions on the procedures for establishing the record table:

> Each year the IARU Region I record table as well as the national record table should be published in the national amateur radio magazine, accompanied by a request to the readers for submitting necessary changes. Claimed records should be carefully checked. For instance, for tropo records check the weather map for the day in question, for sporadic-E records check the time of the year and the time of day and, if possible, compare the claim with reports on other QSO's made during the opening. It has occurred that long meteor- scatter bursts were taken for a short sporadic-E opening! Be also aware of the possibility that 28, 21 or 14 MHz QSO's may mistakenly be reported as 145 MHz QSO's by stations using transverter systems. Check whether QSL cards have been exchanged. Please note that records are only established for different propagation modes, and that the Region I list does not deal with different transmission modes (CW, SSB etc.) or with "firsts". From the above it is clear that a sound record table can only be established in close co-operation with all national VHF and Microwave Managers or Committees.

At the IARU Region I Conference in De Haan (1993) John Morris, GM4ANB, was elected as the successor of SM5AGM. 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.

13 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([3]):

> 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 Cetrificate 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.

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

13.1 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([4]) 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.

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