40th WG FM MEETING **FM(01)163**
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Subject: Implementation of Recommendation 62-01 (Info & Report)

Summary
Recommendation 62-01 is in use for more than four years. For technically minded amateurs it became a challenge. It stimulates amateur innovative techniques and propagation research. Remarkable results have been achieved. The CEPT initiative crossed the Atlantic. The amateur community is grateful to the CEPT constituent bodies for the possibilities open. The report briefly reviews the history, results, implementation aspects and amateur expectations.

CEPT/ERC Recommendation 62-01 E (Mainz 1997)

THE USE OF THE BAND 135.7-137.8 kHz BY THE AMATEUR SERVICE

Recommendation adopted by the Working Group "Frequency Management" (WG FM):

The European Conference of Postal and Telecommunications Administrations (CEPT),

considering

a) that the Amateur Service is a service according to the ITU Radio Regulations for the purpose of self-training, intercommunication and technical investigations carried out by amateurs;
b) that radio amateurs conduct experiments in radiowave propagation and radiocommunication on a regular basis;
c) that the Low Frequency (LF) bands are of particular interest for investigating as yet little understood propagation phenomena;
d) that no Europe-wide allocations have been made to the Amateur Service for this purpose in the LF bands;
e) that in ITU Region 1 the band 130-148.5 kHz is allocated to the Maritime Mobile Service and the Fixed Service on a primary basis;
f) that in general operators in the Amateur Service are used to sharing frequencies with other services which have higher category frequency allocations;
g) that ERC Report 25 containing the European Table of Frequency Allocations and Utilisations does not yet include the LF bands,

recommends

that the band 135.7-137.8 kHz may be used with a maximum e.r.p. of 1 Watt on a secondary basis by the Amateur Service in CEPT countries.

Implementation of CEPT-ERC Recommendation 62-01

Information & Report by International Amateur Radio Union, Region 1

1. Historical background

Marconi and Popov started with kilometric waves. Having seen the results of these imaginative and talented pioneers everybody attempted to get as much LF spectrum as possible for commercial and military purposes. It was considered that communication range increases with the wavelength, power and antenna size. Higher frequencies were considered unusable and given to radio amateurs.

Amateurs quickly discovered that far greater distances can be reached with much lower power. Radio spectrum became attractive and the process of taking the higher frequencies back from radio amateurs started almost immediately to continue until 1979.

Radio amateurs have always contributed to better understanding of the propagation of radio waves throughout the entire spectrum. Technical experimentation and propagation investigation are the essence of the amateur services and exposed in their ITU RR description. This can best be supported by an access to the family of frequencies distributed throughout the entire radio frequency spectrum from kilometric to millimetric waves.

In spite of these amateur achievements and some still little understood propagation phenomena on low frequencies, the Amateur service has no RR allocation in the LF range. Concluding the preparatory ITU-CCIR studies to WARC-79 the desirability of such small secondary access was emphasised by SPM-WARC79; however WARC-79 ran out of time and the subject was left unresolved.

IARU recommended to seek a modest access to this part of the radio spectrum. Amateurs in Australia, New Zealand and USA achieved limited access to 165 - 190 kHz and 160 - 190 kHz respectively, on non-interference-basis. The IARU Region 1 recommended to attempt for such an access possibly in a harmonised manner. The UK-amateurs obtained an access to 71.6 - 74.4 kHz segment.

At the December ‘95 WGFM meeting (Sofia), the German administration referred to the IARU recommendation and announced the proposal for the European harmonised secondary amateur segment 142-147 kHz, for trial purposes. The proposal was not substantively discussed at that meeting, nevertheless some initial views were expressed, including support from IARU who emphasised the value of amateur technical & propagation research.

At the February ‘96 WGFM meeting the proposal was re-issued. The proposed segment 142-147 kHz was questioned by several administrations, mainly due to some military (naval) hesitations. IARU explained that the potential interference from amateur low-ERP emissions would be negligible, nevertheless amateurs would welcome alternative arrangement as well. The WGFM invited its monitoring sub-group PT-22 to search for an alternative in the 130 - 150 kHz area.

The CEPT WGFM approach to the amateur requirement was remarkable. Looking for suitable segment the WGFM-PT22 conducted a monitoring campaign that involved 18 stations from 14 countries. The evaluated results were summarised in the document FM(96)123 presented to the September ‘96 WGFM meeting; it appeared that the segment 135.7 - 141.4 kHz would be suitable. A

summarising document was issued as FM(96)146 and circulated afterwards as the input document to the subsequent WGFM meeting.

IARU explanations provided directly to military representatives at WGFM contributed to relax military concerns.

The matter was brought to the attention of the December '96 WGFM meeting together with the results of CEPT-monitoring and UK-experience. The segment 135.7 - 141.4 kHz was confirmed as the most appropriate. However the German administration informed that it cannot support such option in full due to the assignment of a protected channel for Trans-European electric power systems at 139 kHz. To avoid any further delay the meeting decided for the narrower but immediate solution and agreed that the core-band 135.7 - 137.8 kHz should be allocated to the Amateur service on a secondary basis in the CEPT-countries. Two administrations reserved their position in regard to this decision.

The WGFM chairman invited ERO to prepare a suitable text of the CEPT ERC Draft Recommendation. This was proposed to the February '97 WGFM meeting (Odense) and adopted. After consultation with the WGRR chairman the draft Recommendation 62-01was presented to the CEPT-ERC public consultation for final approval.

2. Recommendation approved

The public consultation process got completed and reported to the April '97 WGFM meeting (Mainz). The 1W ERP limit has been included and initial reservations of the Czech and Hellenic Republics withdrawn. The Recommendation 62-01 came into force.

The amateur community wishes to express again the heartiest thanks to the CEPT-ERC, the ERO and especially to WGFM for this successfully implemented initiative, understanding and support received.

3. Implementation and use

The Recommendation has been fully implemented (included in regular amateur licenses) first in Finland in April '97 following by 13 other CEPT countries. Limited implementation (special licenses on request) reported from few more countries.

Despite extremely narrow band, amateurs have undertaken very successful propagation experiments. Propagation research amateur beacon DA0LF has commenced its operation in Germany. Although initially contacts in order of 100 km were perceived as success, those soon have been extended to thousands kilometres e.g. between Germany, UK and Scandinavian amateurs.

The CEPT initiative crossed the Atlantic. Successful one-way propagation research tests have motivated the Canadian and US administrations to issue experimental amateur licenses for the same band. Transcontinental two-way tests brought exciting results such as contacts between Europe and Canada & USA at distances of 6700 km.

How is it possible with ERP below 1 W? Again technically minded amateurs have proven their abilities. Usually home-brew or adapted HF commercial equipment is used. Very slow Morse transmissions are being received well below an average noise level thanks to digital signal processing and extremely narrow receiver bandwidths in order of a mHz (mili-Hertz!). Early work was undertaken

using PSK31, both BPSK and QPSK.. BPSK experiments developed by the Canadian amateur VE1IQ and a signal integrating mode called WOLF developed by the US amateur KK7KA have taken place.

On the other side of the Atlantic there are now initiatives to bring the matter to the attention of CITEL and extend it to more CITEL countries. There is also considerable interest in some Region 3 countries.

During the four-years trial period no single case of interference from the amateur service to primary users has been reported so far. This fact should discharge hesitation of the remaining CEPT administrations who have not yet implemented REC 62-01 and motivate them to join the others who actively support technically inventive and creative amateurs in their countries. To contrary, amateurs suffer interference from unstable non-licensed SRD devices and from unwanted products of 139 kHz high power system.

4. Expectations

- The amateur community believes that the four years trial period in Europe and follow-up in America have proven the value of this Recommendation.
- The amateur community believes that the WGFM would be in a position to endorse further implementation of REC 62-01 in the remaining CEPT countries for the purpose of supporting the valuable aspects of amateur radio e.g. technical experimentation and propagation research.
- Stemming from technical considerations the attention of administrations is invited to the aspect of determining the ERP of amateur stations at LF. This can best be done by measuring the radiated field-strength in a true far-field zone e.g. 10 wavelengths or more (min 22 km away from an amateur station). ITU-CCIR propagation curves can be used as a handy tool when performing such measurements. It should be taken into account that in the average amateur circumstances the amateur LF antenna systems can be hardly more efficient than minus 40 dB. Practically, the amateur LF station transmits not more than 100 mW ERP!

Acronyms:

AT	-	Amateur service
BC	-	Broadcasting service (terrestrial, sound)
BPSK	-	Bi-(Binary) Phase Shift Keying
CEPT	-	European Conference of Postal and Telecommunication Administrations
CCIR	-	International Consultative Committee for Radiocommunications (now ITU-R)
CW	-	CW telegraphy
ERC	-	European Radiocommunications Committee (of the CEPT)
FX	-	Fixed service (terrestrial)
IARU	-	International Amateur Radio Union
ITU	-	International Telecommunications Union
LM	-	Land-Mobile service
PSK31	-	Phase Shift Keying 31
QPSK	-	Quaternary/Quadrature Phase Shift Keying
R1, 2, 3	-	ITU Regions 1, 2, 3 respectively
RR	-	ITU Radio Regulations
SSB	-	Single-sideband reduced carrier telephony
SPM	-	Special Preparatory Meeting (of the ITU to WARC), approx. eq. to present CPM
WARC	-	World Administrative Radio Conference (ITU)
WGFM	-	Working Group Frequency Management (of the CEPT-ERC)
WGFM PT22	-	Project Team 22 for Monitoring (of the CEPT-ERC-WGFM)
WGRR	-	Working Group Radio Regulatory (of the CEPT-ERC)
WOLF	-	Weak Signal mOde for Low Frequencies
WRC	-	World Radiocommunications Conference (ITU).