



Commission for  
**Communications Regulation**

## Information Document

### **Radio Experimenter Examinations**

**Information document for parties interested in conducting the  
Irish Radio Experimenter Examinations according to CEPT ECC  
REC T/R 61-02.**

<b>Document No:</b>	<b>ComReg 05/10</b>
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**An Coimisiún um Rialáil Cumarsáide**

**Commission for Communications Regulation**

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## **1 Statement of Purpose**

Expressions of interest are invited from parties who are interested in setting, organising and correcting the examination for the Experimenter's Licence in conformity with the CEPT HAREC (Harmonised Amateur Radio Certificate) examination standard as outlined in Electronic Communications Committee (ECC) Recommendation T/R 61-02 (Chester 1990, revised in Nicosia 1994, The Hague 01, Vilnius 04) HARMONISED AMATEUR RADIO EXAMINATION CERTIFICATE<sup>1</sup>

The Commission for Communications Regulation will assess all Expressions of Interest received on or before the deadline of 25<sup>th</sup> of March 2005 to determine if the submitting parties are competent to set, organise and correct the examination to the required standard. If any of the parties are deemed competent, then the Commission will enter into a contract with the most suitable party to agree that examinations set, organised and corrected by them are of the standard required to qualify applicants for Experimenters' licences.

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<sup>1</sup> See Appendix 1 and <http://www.ero.dk/documentation/docs/doc98/official/pdf/TR6102.PDF>

## 2 Background and Legislation

Experimenters' Licences are issued to Radio Experimenters (Radio Amateurs) to permit them to operate apparatus for wireless telegraphy used for the purposes of conducting experiments and engaging in self-training in wireless telegraphy. In order to qualify for an Experimenter's Licence, applicants must sit and pass an examination in radio theory and the regulations that apply to Radio Experimenter Stations and radio operation in general. Currently there are approximately 2000 Radio Experimenter Licence holders in Ireland with up to 40 prospective new applicants sitting the exam each year.

The Commission for Communications Regulation is the regulatory body responsible for the management of the radio spectrum in Ireland and as such issues Experimenters' Licences in Ireland under the Wireless Telegraphy (Experimenter's Licence) Regulations, 2002<sup>2</sup>. The Regulations define an Experimenter as;

“a person licensed under these regulations who keeps, has possession of, installs, maintains, works or uses apparatus for wireless telegraphy solely for the purposes of conducting experiments, intercommunication and engaging in self training in wireless telegraphy.”

Licensed Experimenters use their stations to participate in the amateur service as defined in the Radio Regulations of the International Telecommunications Union. The Radio Regulations of the International Telecommunications Union define the amateur service as:

“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.”

Under the Irish Regulations, before issuing a licence, the Commission for Communications Regulation must be satisfied that an applicant for an Experimenter's Licence has

(1) a satisfactory knowledge of the adjustment and operation of the station in respect of which such licence is applied for

and

(2) a satisfactory knowledge of the radio regulations as issued and amended by the International Telecommunications Union.

To that end, the Commission for Communications Regulation only requires that applicants pass an examination to a set standard, in order to be eligible for a licence. However under legislation<sup>3</sup> the Commission for Communications Regulation has no responsibility for conducting examinations as such.

In previous years Experimenter examinations were conducted by the Marine Radio Surveyors' Office of what is now the Department of Communications, Marine and Natural Resources. The Marine Radio Surveyors' Office withdrew from conducting the examinations in 2003 and the Commission for Communications Regulation now invites Expressions of Interest from parties interested in conducting the examination for the Experimenter' Licence on an initial three year basis. This period may be extended subject to satisfactory performance. The examination format and the standard required are outlined in the following sections.

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<sup>2</sup> SI No 450 of 2002 - Wireless Telegraphy (Experimenter's Licence) Regulations

<sup>3</sup> See Regulation 7 of the Wireless Telegraphy (Experimenter's Licence) Regulations, 2002

## **3 Examinations**

### **3.1 Examination Format**

The examination may be in either a written answer or multiple choice format and must consist of three compulsory sections as follows:

#### **Section A: Elementary Theory of Radiocommunications**

This section consists of questions relating to electromagnetic fields, electronic components and circuits, transmitters and propagation etc.

#### **Section B: National and International Operating Rules and Procedures**

This section consists of questions relating to such matters as use of Q-Code, bands allocated to the Amateur/Experimenter service, call-signs and record keeping etc.

#### **Section C: Safety and Electromagnetic Compatibility**

The safety component of this section consists of questions relating to safety in the presence of high voltages and RF and precautions that must be taken with radio installations to guard against lightning and other hazards. The electromagnetic compatibility component relates to such topics as interference in electronic equipment, causes of interference in electronic equipment and measures against such interference.

The topics to be examined must conform with the HAREC syllabus. For a more detailed outline of the examination syllabus and requirements for a HAREC please refer to Annex 6 of T/R 61-02<sup>4</sup> The syllabus must be covered in enough detail in the exam so that the Commission for Communications Regulation can satisfy itself that successful candidates are suitably qualified. Interested parties should also pay attention to any proposed marking scheme and pass mark in this regard. The Commission regard a minimum pass mark of 50% in each of the three sections as being obligatory.

In some cases the Commission for Communications Regulation may determine that licence applicants are exempt from one or more components of the examination on the basis of their prior qualifications. Prior to the examination these applicants will be issued with a letter of exemption which must be presented at the examination. In such cases, applicants are only required to sit the sections of the examination in which they have not obtained an exemption.

### **3.2 Examination Marking Scheme**

When the exam is submitted to the Commission for approval it must be accompanied by a clear and unambiguous marking scheme, detailing the breakdown and allocation of marks for each question.

The marking scheme should also detail the section pass mark and if a multiple choice scheme is being proposed, whether negative marking is to be used for incorrect answers. Once again interested parties need to satisfy the Commission that their exam will lead to candidates who are suitably qualified in accordance with the CEPT HAREC standard.

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<sup>4</sup> See Appendix 1 and <http://www.ero.dk/documentation/docs/doc98/official/pdf/TR6102.PDF>

### **3.3 Appeals and Results**

The Commission for Communications Regulation must be notified of the results within two working weeks of the exam date after which the Commission will contact successful candidates and issue their licences and certificates as applicable.

Any appeals against the result of the examination must be made in writing to the Commission for Communications Regulation within 28 days of the recorded notification of the result. The decision of the Commission will be final.

## **4 Contract Issues**

### **4.1 Scope of Work**

Execution of this contract will involve:

- Responsibility for setting, organising and correcting the examination for the Experimenter's Licence to the HAREC standard as outlined above.
- Responsibility for preparing a clear and unambiguous marking scheme as outlined above.
- The procurement of suitable premises in which to hold the examination.
- No administrative assistance from the Commission for Communications Regulation.
- Holding a minimum of an annual examination, on the presumption that there is a feasible number of candidates.
- If multiple choice is used, devising and maintaining a suitable pool of questions from which examinations may be composed. This pool should be suitably large enough to minimise learning by rote and must adequately prove a candidate's knowledge.
- Facilitating the visually impaired to take the exam and applicants with physical or other impairments to take the exam by means of oral examination or other means.

### **4.2 Obligations of Contractor**

The contractor or its staff must not conduct or be involved in any way whatsoever in any course of instruction which is intended to prepare students for the Experimenter examination within or out with the jurisdiction. A breach of this rule will lead to the disqualification of the contractor without appeal and the annulment of any or all examination results issued by the contractor.

- The contractor must submit the exam paper to the Commission for Communications Regulation no later than 25 working days before the date on which the examination is due to be held. This is in order for the Commission to determine if the exam paper is HAREC compliant. Please note that the Commission for Communications Regulation reserves the right to refuse applications for an Experimenter's licence submitted on the basis of an examination if it is of the opinion that the exam paper is not HAREC compliant.
- The contractor must also submit the time, date and place of the exam to the Commission for Communications Regulation no later than 25 working days before the date on which the examination is due to be held.
- The contractor must agree to the presence of officers of the Commission for Communications Regulation at examinations without prior notice.
- The contractor must undertake to procure exam premises, which allows access to people with mobility or other impairments.

### **4.3 Disclaimer**

If, at any time, the Commission is not satisfied that a particular examination set, organised and corrected by the contractor is not in conformity with the HAREC standard or other standards set out above in this document, it may refuse to entertain applications from intending Radio Experimenters who have passed that examination.

### **4.4 Remuneration**

The contractor will be allowed to charge an exam fee which will be subject to the prior approval of the Commission. No funding will be received from the Commission for Communications Regulation and no fees will be payable to the Commission.

### **4.5 Qualifications / Competencies Required of contractor**

Proposals will be assessed according to the following criteria.

- Previous experience in setting, organising and correcting Experimenter examinations or extensive experience as a licensed Radio Experimenter with more than five years active involvement in a Radio Experimenter society or club.
- Demonstrable knowledge of the CEPT HAREC standard.
- Capability and facilities to set, organise and correct examinations several times a year.

### **4.6 Period of Performance**

The period of performance shall begin upon the date the contract is signed by all parties and extend for three years. The contract may be subsequently extended for a further period to be agreed by both parties.



## **5 Submission of Applications**

### **5.1 Application Process**

#### **1. Deadline**

Proposals must be received no later than: 17:00 hrs on 25<sup>th</sup> of March 2005. Proposals received after this time will not be evaluated. Proposals should be in the format outlined below.

#### **2. Rejection Of Proposals**

The Commission for Communications Regulation reserves the right to reject any or all responses to this Request for Proposal.

#### **3. Clarification Of Responses**

The Commission for Communications Regulation reserves the right to obtain clarification of any point in an applicant's proposal or to obtain additional information necessary for the proper evaluation of a particular proposal. This may include the submission and presentation of the proposed schemes by all applicants. Failure of an applicant to respond to such a request for additional information or clarification will result in the disqualification of the applicant.

### **5.2 Proposal Format**

All proposals must contain the following information:

- A concise description of how the applicant meets the requirements listed in the Qualifications/Competencies Required section above.
- A plan demonstrating how the applicant will fulfil the items listed in the Scope of Work section above.
- Name and contact information for the key person assigned by the applicant to this project.
- Resumés or background descriptions of all key personnel to be assigned to this project.
- Procedures detailing how the applicant intends to ensure the integrity and transparency of the process including the exclusion of the examination personnel from invigilation and the provision of courses.
- Information on work, if any, (similar to the current project) completed by the applicant over the past five years. A minimum of three complete references must be submitted
- A description of the examination fee the applicant intends to charge.
- A specimen examination paper.
- A proposed examination marking scheme and required pass marks
- A description of the size of the proposed question pool and whether negative marking is to be used in the case of a multiple choice examination.

### **5.3 Legal Disclaimer**

This Information Document is issued for guidance only and does not constitute a warranty nor does it form part of any contract into which the Commission for Communications Regulation may enter.

## 6 Appendix I

### 6.1 HAREC Recommendation

Recommendation T/R 61-02 (Chester 1990, revised in Nicosia 1994, The Hague 01, Vilnius 04)

#### HARMONISED AMATEUR RADIO EXAMINATION CERTIFICATE

Recommendation proposed by the Working Group "Radio Regulatory" (RR)

*Text of the Recommendation adopted by Electronic Communications Committee (ECC)*

#### INTRODUCTION

The Recommendation as approved in 1990 makes it possible for CEPT administrations to issue a Harmonised Amateur Radio Examination Certificate (HAREC). The HAREC document shows proof of successfully passing an amateur radio examination which complies with the Examination Syllabus for the HAREC. It facilitates the issuing of an individual licence to radio amateurs who stay in a country for a longer term than that mentioned in CEPT Recommendation T/R 61-01. It also facilitates the issuing of an individual licence to a radio amateur returning to his native country showing the HAREC certificate issued by a foreign Administration.

The Recommendation as revised in 1994 has the aim to make it possible for non-CEPT countries to participate in this system. This revision is comparable to the extension of Recommendation T/R 61-01 to non-CEPT countries.

The revision of 2001 lowered the requirements for sending and receiving Morse code signals from 12 words per minute to 5 words per minute.

The revision of 2003 removed the requirement for sending and receiving of Morse code signals.

“The European Conference of Postal and Telecommunications Administrations,

*considering*

- a) that the Amateur Service is a service according to the ITU Radio Regulations article 1 and governed by the ITU Radio Regulations and national regulations,
- b) that administrations are responsible, in accordance with article 25 of the ITU Radio Regulations, to verify the operational and technical qualifications of any person wishing to operate an amateur station,
- c) that significant differences between the existing national regulations and licence conditions impede the radiocommunication activities by licensed radio amateurs outside their own country,
- d) that in an international context the International Amateur Radio Union has supported the concept of the harmonisation of examination levels concerning the amateur service,
- e) that CEPT Recommendation T/R 61-01 concerns only temporary use of amateur stations in CEPT and non-CEPT countries,
- f) that CEPT countries and non-CEPT countries are mutually seeking to harmonise regulations and matters also concerning non commercial and recreational activities of their citizens,

*noting*

- a) that it is highly desirable to establish a common arrangement for radio amateurs who wish to use amateur stations in another country in which they are taking up residency,
- b) that a common approach can be found in spite of the great variety of classes of amateur licenses and examinations prevailing in the different CEPT countries and non-CEPT countries,
- c) that on the basis of this commonality it is possible to designate which national classes of amateur licences and examinations are of a similar nature,
- d) that in general good experience has been gained by the introduction of Recommendation T/R 61-01 although the classification of the various national licence classes into the CEPT licence causes some difficulties regarding the minimum examination standard,
- e) that despite the procedures of this Recommendation, administrations have the right to require separate bilateral agreements when recognising the radio amateur certificates issued by foreign administrations,

*recommends*

- a) that CEPT administrations issue a mutually recognised Harmonised Amateur Radio Examination Certificate to those passing the relevant national examinations corresponding to the CEPT examination standard (see Annex 1),
- b) that administrations, not being members of CEPT, accepting the provisions of this Recommendation, may apply for participation in accordance with the conditions laid down in Annexes 3 and 4,
- c) that administrations participating in this system agree, subject to their national laws and regulations to issue national licences corresponding to the CEPT examination standard to foreign nationals who possess a Harmonised Amateur Radio Examination Certificate issued by an Administration participating in this system and who stay in their country for a period longer than three months,
- d) that any person who has obtained a Harmonised Amateur Radio Examination Certificate in any country participating in this system, has the right on return to his own country to obtain a licence there without having to pass a further examination,
- e) that administrations shall ensure that the information shown in Annex 2 and Annex 4 (licence classes equivalent to the CEPT examination level) is kept up-to-date when national legislation is amended.”

Please check the Office web site (<http://www.ero.dk>) for the up to date position on the implementation of this and other ECC and ERC Recommendations.

## **ANNEX 1**

### **CONDITIONS FOR ISSUING OF THE HARMONISED AMATEUR RADIO EXAMINATION CERTIFICATE (HAREC)**

- 1.a A HAREC will be issued by CEPT administrations to persons who have passed a national examination for radio amateurs that meets the criteria set out in paragraph 2 below. (The national licences corresponding to such examinations are set out in Annex 2).
- 1.b A HAREC will be issued by non-CEPT administrations to persons who have passed a national examination for radio amateurs that meets the criteria set out in paragraph 2 below. (The national licences corresponding to such examinations are set out Annex 4).
- 1.c A HAREC will be issued, on request, by CEPT administrations to radio amateurs who have passed the relevant national examination prior to the introduction of the harmonised examination syllabus.
- 1.d A licence based on HAREC allows the use of all frequency bands allocated to the amateur service and amateur satellite service and authorised in the country where the amateur station is to be operated.
- 1.e National licences corresponding to HAREC and licences administrations will issue to holders of the HAREC from other countries are shown in Annex 2 and Annex 4.

#### **2. Criteria for national examinations**

National examinations which qualify the examinee for a HAREC certificate shall cover the subjects that a radio amateur may encounter in conducting tests with an amateur station and with its operation.

They must include at least *technical, operational and regulatory matters* (see the examination syllabus Annex 6)

#### **3. The HAREC document**

The Harmonised Amateur Radio Examination Certificate shall contain at least the following information in the language of the country of issue as well as in English, French and German:

- a) a statement to the effect that the holder has passed an examination, meeting the requirements described in this recommendation
- b) the holder's name and date of birth
- c) the date of issue
- d) the issuing authority.

The necessary information can be included in the national certificate or in a special document as set out in Annex 5.

## ANNEX 2

### NATIONAL LICENCE CLASSES EQUIVALENT TO THE CEPT EXAMINATION LEVEL

Countries wishing to modify their entries should send a letter to that effect to the Chairman of the ECC with a copy to the Office.

1 CEPT countries	2 National licences issued by home Administrations equivalent corresponding to HAREC	3 National Licences that the Administration will issue will be issued to the holders of a HAREC from other countries
Country		
Albania		
Austria		
Andorra		
Belgium	A	A
Bosnia and Herzegovina		
Bulgaria		
Croatia	A	A
Cyprus	1 and 2	1 and 2
Czech Republic		
Denmark	A	A
Faroe islands	A	A
Greenland <sup>5</sup>	A, D, E	E
Estonia	A, B	A <sup>6</sup> , B
Finland	Y and T	Y
France		
Germany	1 and 2	1 and 2
Greece		
Hungary		
Iceland		
Ireland		
Italy		
Latvia		
Liechtenstein		
Lithuania		
Luxembourg		
Malta		
Moldova		
Monaco		
Netherlands	A, C and F	F
Norway		
Poland		
Portugal	1	1
Romania		

<sup>5</sup> For use of HF bands, Morse code is still required.

<sup>6</sup> Confirmation of Morse code ability (min 5 words per minute) is required.

Russian Federation		
San Marino		
Slovak Republic		
Slovenia		
Spain		
Sweden		
Switzerland	1, 2, CEPT	CEPT
Turkey	B	B
Ukraine		
United Kingdom	FULL	FULL
Vatican City		
former Yugoslav Republic of Macedonia		

### **ANNEX 3**

#### **PARTICIPATION OF NON-CEPT ADMINISTRATIONS IN THE CEPT RADIO AMATEUR CERTIFICATE ACCORDING TO THIS RECOMMENDATION**

##### **1. APPLICATION**

- 1.1. Administrations, not being members of CEPT, may apply for participation in the CEPT arrangements for Harmonised Amateur Radio Examination Certificates regulated by this Recommendation. Applications shall be sent to CEPT European Radiocommunications Office (ERO) in Copenhagen (address: Peblingehus, Nansensgade 19, DK-1366 Copenhagen, Denmark).

The information needed to support an application shall include: a list of certificate classes in the country concerned; their privileges and the equivalence to the CEPT examination level. Details of national examination syllabuses or documents describing the requirements of the national certificate classes and their privileges shall be enclosed with the application.

All the details mentioned above must be submitted in one of the official languages of the CEPT (English, French or German).

##### **2. PROCEDURES OF APPLICATIONS**

- 2.1 The CEPT ECC shall check, based on this Recommendation, each application to determine the equivalence of the national licence classes to the HAREC level and to assess the acceptability of any deviations from this Recommendation.
- 2.2 When the ECC has agreed to accept the participation of a non-CEPT country it notifies the applying Administration and arranges for the ERO to include the relevant details in Annex 4.
- 2.3 A CEPT Administration requiring a separate bilateral agreement to apply this Recommendation with a non-CEPT Administration, shall indicate this in a footnote in Annex 2.
- 2.4 A non-CEPT Administration requiring a separate bilateral agreement to apply this Recommendation with a CEPT Administration, shall include this in a footnote in Annex 4.

## ANNEX 4

### TABLE OF EQUIVALENCE BETWEEN NATIONAL CLASSES OF NON-CEPT COUNTRIES AND THE HAREC

1	2 National Licences equivalent corresponding to HAREC:	3 National Licences the Administration will to be issued to holders of a HAREC from other countries
Country		
Australia <sup>7</sup>		
Hong Kong	Amateur Station Licence	Amateur Station Licence
Israel	A, B	B (General)
South Africa		

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<sup>7</sup> New licensing arrangements are expected to be in force approximately in May 2005. It is anticipated that the highest examination level will be equivalent to the CEPT HAREC. A class licence will be introduced for overseas visitors. For more information please check the ACA website: [www.aca.org.au](http://www.aca.org.au)



## ANNEX 5

### HARMONISED AMATEUR RADIO EXAMINATION CERTIFICATE (HAREC) based on CEPT Recommendation T/R 61-02

### CERTIFICAT D'EXAMEN RADIOAMATEUR HARMONISE (HAREC) délivré sur la base de la Recommandation de la CEPT T/R 61-02

### HARMONISIERTE AMATEURFUNK-PRÜFUNGSBESCHEINIGUNG (HAREC) nach CEPT Empfehlung T/R 61-02

1. The issuing Administration or responsible issuing Authority

\_\_\_\_\_

of the country

\_\_\_\_\_

declares herewith that the holder of this certificate has successfully passed an amateur radio examination which fulfils the requirements laid down by the International Telecommunication Union (ITU). The passed examination corresponds to the examination described in CEPT Recommendation T/R 61-02 (HAREC).

2. L'Administration ou l'Autorité compétente

\_\_\_\_\_

du pays \_\_\_\_\_

certifie que le titulaire du présent certificat a réussi un examen de radioamateur conformément au règlement de l'Union internationale des télécommunications (UIT). L'épreuve en question correspond à l'examen décrit dans la Recommandation CEPT T/R 61-02 (HAREC).

3. Die ausstellende Verwaltung oder zuständige Behörde

\_\_\_\_\_

des Landes

\_\_\_\_\_

erklärt hiermit, dass der Inhaber dieser Bescheinigung eine Amateurfunkprüfung erfolgreich abgelegt hat, welche den Erfordernissen entspricht, wie sie von der Internationalen Fernmeldeunion (ITU) festgelegt sind. Die abgelegte Prüfung entspricht der in der CEPT-Empfehlung T/R 61-02 (HAREC) beschriebenen Prüfung.

4. Holders name      Nom du titulaire      Name des Inhabers

\_\_\_\_\_

Date of birth      Date de naissance      Geburtsdatum

5. Officials requiring information about this certificate should address their enquiries to the issuing national Authority or the issuing Administration indicated below.

Les autorités officielles désirant des informations sur ce document devront adresser leurs demandes à l'Administration ou à l'Autorité nationale compétente mentionnée ci-dessous.

Behörden, die Auskünfte über diese Bescheinigung erhalten möchten, sollten ihre Anfragen an die genannte ausstellende nationale Behörde oder die ausstellende Verwaltung richten.

Address/Adresse/Anschrift

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Telephone/Téléphone/Telefon: \_\_\_\_\_  
: \_\_\_\_\_

Telefax/Téléfax/Telefax:

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Signature/Signature/Unterschrift  
Stempel

Official stamp/Cachet Officiel/Offizieller

(Place and date of issue/Lieu et date d'émission/Ort und Ausstelldatum)

## **ANNEX 6**

### **EXAMINATION SYLLABUS AND REQUIREMENTS FOR A HAREC**

#### **INTRODUCTION**

This syllabus has been produced for the guidance of the administrations so that they may prepare their national amateur radio examinations for the CEPT Harmonised Amateur Radio Examination Certificate (HAREC).

The purpose of the examination is to set a reasonable level of knowledge required for candidate radio amateurs wishing to obtain a license for operating amateur stations.

The scope of the examination is limited to subjects relevant to tests and experiments with, and operation of amateur stations conducted by radio amateurs. These include circuits and their diagrams; questions may relate to circuits using both integrated circuits and discrete components.

- a) Where quantities are referred to, candidates should know the units in which these quantities are expressed, as well as the generally used multiples and sub-multiples of these units.
  - b) Candidates must be familiar with the compound of the symbols.
  - c) Candidates must know the following mathematical concepts and operations:
    - adding, subtracting, multiplying and dividing
    - fractions
    - powers of ten, exponentials, logarithms
    - squaring
    - square roots
    - inverse values
    - interpretation of linear and non-linear graphs
    - binary number system
  - d) Candidates must be familiar with the formulae used in this syllabus and be able to transpose them.

**EXAMINATION SYLLABUS FOR A HARMONISED AMATEUR RADIO  
EXAMINATION CERTIFICATE (HAREC)**

**a) TECHNICAL CONTENT**

**1. ELECTRICAL, ELECTRO-MAGNETIC AND RADIO THEORY**

- 1.1 Conductivity**
- 1.2 Sources of electricity**
- 1.3 Electric field**
- 1.4 Magnetic field**
- 1.5 Electromagnetic field**
- 1.6 Sinusoidal signals**
- 1.7 Non-sinusoidal signals, noise**
- 1.8 Modulated signals**
- 1.9 Power and energy**
- 1.10 Digital signal processing (DSP)**

**2. COMPONENTS**

- 2.1 Resistor**
- 2.2 Capacitor**
- 2.3 Coil**
- 2.4 Transformers application and use**
- 2.5 Diode**
- 2.6 Transistor**
- 2.7 Heat dissipation**
- 2.8 Miscellaneous**

**3. CIRCUITS**

- 3.1 Combination of components**
- 3.2 Filter**
- 3.3 Power supply**
- 3.4 Amplifier**
- 3.5 Detector**
- 3.6 Oscillator**
- 3.7 Phase Locked Loop [PLL]**
- 3.8 Discrete Time Signals and Systems (DSP-systems)**

**4. RECEIVERS**

- 4.1 Types**
- 4.2 Block diagrams**
- 4.3 Operation and function of the following stages**
- 4.4 Receiver characteristics**

**5. TRANSMITTERS**

- 5.1 Types**
- 5.2 Block diagrams**
- 5.3 Operation and function of the following stages**
- 5.4 Transmitter characteristics**

**6. ANTENNAS AND TRANSMISSION LINES**

- 6.1 Antenna types**
- 6.2 Antenna characteristics**
- 6.3 Transmission lines**

## **7. PROPAGATION**

## **8. MEASUREMENTS**

**8.1 Making measurements**

**8.2 Measuring instruments**

## **9. INTERFERENCE AND IMMUNITY**

**9.1 Interference in electronic equipment**

**9.2 Cause of interference in electronic equipment**

**9.3 Measures against interference**

## **10. SAFETY**

### **b) National and International Operating Rules and Procedures**

**1. Phonetic Alphabet**

**2. Q-Code**

**3. Operational Abbreviations**

**4. International Distress Signs, Emergency traffic and natural disaster communication**

**5. Call signs**

**6. IARU band plans**

**7. Social responsibility and operating procedures**

### **c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR SERVICE AND AMATEUR SATELLITE SERVICE**

**1. ITU Radio Regulations**

**2. CEPT Regulations**

**3. National Laws, Regulations and Licence conditions**

# DETAILED EXAMINATION SYLLABUS

## a) TECHNICAL CONTENT

### CHAPTER 1

#### 1. ELECTRICAL, ELECTRO-MAGNETIC AND RADIO THEORY

##### 1.1 Conductivity

- Conductor, semiconductor and insulator
- Current, voltage and resistance
- The units ampere, volt and ohm
- Ohm's Law  $[E = I \cdot R]$
- Kirchhoff's Laws
- Electric power  $[P = E \cdot I]$
- The unit watt
- Electric energy  $[W = P \cdot t]$
- The capacity of a battery [ampere-hour]

##### 1.2 Sources of electricity

- Voltage source, source voltage [EMF], short circuit current, internal resistance and terminal voltage
- Series and parallel connection of voltage sources

##### 1.3 Electric field

- Electric field strength
- The unit volt/metre
- Shielding of electric fields

##### 1.4 Magnetic field

- Magnetic field surrounding live conductor
- Shielding of magnetic fields

##### 1.5 Electromagnetic field

- Radio waves as electromagnetic waves
- Propagation velocity and its relation with frequency and wavelength  $[v = f \cdot \lambda]$
- Polarisation

##### 1.6 Sinusoidal signals

- The graphic representation in time
- Instantaneous value, amplitude  $[E_{\max}]$ , effective [RMS] value and average value

$$\left[ U_{\text{eff}} = \frac{U_{\max}}{\sqrt{2}} \right]$$

- Period and duration of period
- Frequency
- The unit hertz
- Phase difference

##### 1.7 Non-sinusoidal signals

- Audio signals
- Square wave
- The graphic representation in time
- D.C. voltage component, fundamental wave and higher harmonics

- Noise [ $P_N = kTB$ ](receiver thermal noise, band noise, noise density, noise power in receiver bandwidth).

## 1.8 Modulated signals

- CW
- Amplitude modulation
- Phase modulation, frequency modulation and single-sideband modulation
- Frequency deviation and modulation index  $\left[ m = \frac{\Delta F}{f_{\text{mod}}} \right]$
- Carrier, sidebands and bandwidth
- Waveforms of CW, AM, SSB and FM signals (graphical presentation)
- Spectrum of CW, AM and SSB signals (graphical presentation)
- Digital modulations: FSK, 2-PSK, 4-PSK, QAM
- Digital modulation: bit rate, symbol rate (Baud rate) and bandwidth
- CRC and retransmissions (e.g. packet radio), forward error correction (e.g. Amtor FEC)

## 1.9 Power and energy

- The power of sinusoidal signals  $\left[ P = i^2 \cdot R; P = \frac{u^2}{R}; u = U_{\text{eff}}; i = I_{\text{eff}} \right]$
- Power ratios corresponding to the following dB values: 0 dB, 3 dB, 6 dB, 10 dB and 20 dB [both positive and negative]
- The input/output power ratio in dB of series-connected amplifiers and/or attenuators
- Matching [maximum power transfer]
- The relation between power input and output and efficiency  $\left[ \eta = \frac{P_{\text{out}}}{P_{\text{in}}} \cdot 100 \text{ \%} \right]$
- Peak Envelope Power [p.e.p.]

## 1.10 Digital Signal Processing (DSP)

- sampling and quantization
- minimum sampling rate (Nyquist frequency)
- convolution (time domain / frequency domain, graphical presentation)
- anti-aliasing filtering, reconstruction filtering
- ADC / DAC

## CHAPTER 2

### 2. COMPONENTS

#### 2.1 Resistor

- The unit ohm
- Resistance
- Current/voltage characteristic
- Power dissipation

#### 2.2 Capacitor

- Capacitance
- The unit farad
- The relation between capacitance, dimensions and dielectric. (Qualitative treatment only)
- The reactance  $\left[ X_c = \frac{1}{2\pi f \cdot C} \right]$

- Phase relation between voltage and current

### 2.3 Coil

- Self-inductance
- The unit henry
- The effect of number of turns, diameter, length and core material on inductance. (Qualitative treatment only)
- The reactance  $[X_L = 2\pi f \cdot L]$
- Phase relation between current and voltage
- Q-factor

### 2.4 Transformers application and use

- Ideal transformer  $[P_{prim} = P_{sec}]$
- The relation between turn ratio and:
  - voltage ratio  $\left[ \frac{u_{sec}}{u_{prim}} = \frac{n_{sec}}{n_{prim}} \right]$
  - current ratio  $\left[ \frac{i_{sec}}{i_{prim}} = \frac{n_{prim}}{n_{sec}} \right]$
- impedance ratio. (Qualitative treatment only)
- Transformers

### 2.5 Diode

- Use and application of diodes:
  - Rectifier diode, zener diode, LED [light-emitting diode], voltage-variable and capacitor [varicap]
  - Reverse voltage and leakage current

### 2.6 Transistor

- PNP- and NPN-transistor
- Amplification factor
- Field effect vs. bipolar transistor (voltage vs. current driven)
- The transistor in the:
  - common emitter [source] circuit
  - common base [gate] circuit
  - common collector [drain] circuit
  - input and output impedances of the above circuits

### 2.7 Miscellaneous

- Simple thermionic device [valve]
- Voltages and impedances in high power valve stages, impedance transformation
- Simple integrated circuits (include opamps)

## CHAPTER 3

### 3. CIRCUITS

#### 3.1 Combination of components

- Series and parallel circuits of resistors, coils, capacitors, transformers and diodes
- Current and voltage in these circuits
- Behaviour of real (non ideal) resistor, capacitor and inductors at high frequencies



### 3.2 **Filter**

- Series-tuned and parallel-tuned circuit:
- Impedance
- Frequency characteristic

$$f = \frac{1}{2\pi\sqrt{LC}}$$

- Resonance frequency
- Quality factor of a tuned circuit  $\left[ Q = \frac{2\pi f \cdot L}{R_s}; Q = \frac{R_p}{2\pi f \cdot L}; Q = \frac{f_{res}}{B} \right]$
- Bandwidth
- Band-pass filter
- Low-pass, high-pass, band-pass and band-stop filters composed of passive elements
- Frequency response
- Pi filter and T filter
- Quartz crystal
- Effects due to real (=non-ideal) components
- digital filters (see sections 1.10 and 3.8)

### 3.3 **Power supply**

- Circuits for half-wave and full-wave rectification and the Bridge rectifier
- Smoothing circuits
- Stabilisation circuits in low voltage supplies
- Switching mode power supplies, isolation and EMC

### 3.4 **Amplifier**

- Lf and hf amplifiers
- Gain
- Amplitude/frequency characteristic and bandwidth (broadband vs. tuned stages)
- Class A, A/B, B and C biasing
- Harmonic and intermodulation distortion, overdriving amplifier stages

### 3.5 **Detector**

- AM detectors (envelope detectors)
- Diode detector
- Product detectors and beat oscillators
- FM detectors

### 3.6 **Oscillator**

- Feedback (intentional and unintentional oscillations)
- Factors affecting frequency and frequency stability conditions necessary for oscillation
- LC oscillator
- Crystal oscillator, overtone oscillator
- Voltage controlled oscillator (VCO)
- Phase noise

### 3.7 **Phase Locked Loop [PLL]**

- Control loop with phase comparator circuit
- Frequency synthesis with a programmable divider in the feedback loop

### 3.8 **Digital signal processing (DSP systems)**

- FIR and IIR filter topologies
- Fourier Transformation (DFT; FFT, graphical presentation)
- Direct Digital Synthesis

## CHAPTER 4

### 4. RECEIVERS

#### 4.1 Types

- Single and double superheterodyne receiver
- Direct conversion receivers

#### 4.2 Block diagrams

- CW receiver [A1A]
- AM receiver [A3E]
- SSB receiver for suppressed carrier telephony [J3E]
- FM receiver [F3E]

#### 4.3 Operation and function of the following stages (Block diagram treatment only)

- HF amplifier [with tuned or fixed band pass]
- Oscillator [fixed and variable]
- Mixer
- Intermediate frequency amplifier
- Limiter
- Detector, including product detector
- Audio amplifier
- Automatic gain control
- S meter
- Squelch

#### 4.4 Receiver characteristics (simple description treatment)

- Adjacent-channel
- Selectivity
- Sensitivity, receiver noise, noise figure
- Stability
- Image frequency
- Desensitization / Blocking
- Intermodulation; cross modulation
- Reciprocal mixing [phase noise]

## CHAPTER 5

### 5. TRANSMITTERS

#### 5.1 Types

- Transmitter with or without frequency translation

#### 5.2 Block diagrams

- CW transmitter [A1A]
- SSB transmitter with suppressed carrier telephony [J3E]
- FM transmitter with the audio signal modulating the VCO of the PLL [F3E]

#### 5.3 Operation and functions of the following stages (Block diagram treatment only)

- Mixer
- Oscillator
- Buffer
- Driver
- Frequency multiplier
- Power amplifier
- Output matching

- Output filter
- Frequency modulator
- SSB modulator
- Phase modulator
- Crystal filter

#### 5.4 **Transmitter characteristics (simple description)**

- Frequency stability
- RF-bandwidth
- Sidebands
- Audio-frequency range
- Non-linearity [harmonic and intermodulation distortion]
- Output impedance
- Output power
- Efficiency
- Frequency deviation
- Modulation index
- CW key clicks and chirps
- SSB overmodulation and splatter (agreed)
- Spurious RF radiations (agreed)
- Cabinet radiations
- Phase noise

## CHAPTER 6

### 6. ANTENNAS AND TRANSMISSION LINES

#### 6.1 Antenna types

- Centre fed half-wave antenna
- End fed half-wave antenna
- Folded dipole
- Quarter-wave vertical antenna [ground plane]
- Antenna with parasitic elements [Yagi]
- Aperture antennas (Parabolic reflector, horn)
- Trap dipole

#### 6.2 Antenna characteristics

- Distribution of the current and voltage
- Impedance at the feed point
- Capacitive or inductive impedance of a non-resonant antenna
- Polarisation
- Antenna directivity, efficiency and gain
- Capture area
- Radiated power [ERP, EIRP]
- Front-to-back ratio
- Horizontal and vertical radiation patterns

#### 6.3 Transmission lines

Parallel conductor line

- Coaxial cable
- Waveguide
- Characteristic impedance [ $Z_0$ ]
- Velocity factor
- Standing-wave ratio
- Losses
- Balun
- Antenna tuning units (pi and T configurations only)

## CHAPTER 7

### 7. PROPAGATION

- Signal attenuation, signal to noise ratio
- Line of sight propagation (free space propagation, inverse square law)
- Ionospheric layers
- Critical frequency
- Influence of the sun on the ionosphere
- Maximum Usable Frequency
- Ground wave and sky wave, angle of radiation and skip distance
- Multipath in ionospheric propagation
- Fading
- Troposphere (Ducting, scattering)
- The influence of the height of antennas on the distance that can be covered [radio horizon]
- Temperature inversion
- Sporadic E-reflection
- Auroral scattering
- Meteor scatter
- Reflections from the moon

- Atmospheric noise [distant thunderstorms]
- Galactic noise
- Ground (thermal) noise
- Propagation prediction basics (link budget)
  - dominant noise source, (band noise vs. receiver noise)
  - minimum signal to noise ratio
  - minimum received signal power
  - path loss
  - antenna gains, transmission line losses
  - minimum transmitter power

## **CHAPTER 8**

### **8. MEASUREMENTS**

#### **8.1 Making measurements**

- Measurement of:
  - DC and AC voltages and currents
  - Measuring errors:
    - Influence of frequency
    - Influence of waveform
    - Influence of internal resistance of meters
- Resistance
- DC and RF power [average power, Peak Envelope Power]
- Voltage standing-wave ratio
- Waveform of the envelope of an RF signal
- Frequency
- Resonant frequency

#### **8.2 Measuring instruments**

- Making measurements using:
  - Multi range meter (digital and analog)
  - Rf-power meter
  - Reflectometer bridge (SWR meter)
  - Signal generator
  - Frequency counter
  - Oscilloscope
  - Spectrum Analyzer

## **CHAPTER 9**

### **9. INTERFERENCE AND IMMUNITY**

#### **9.1 Interference in electronic equipment**

- Blocking
- Interference with the desired signal
- Intermodulation
- Detection in audio circuits

#### **9.2 Cause of interference in electronic equipment**

- Field strength of the transmitter
- Spurious radiation of the transmitter [parasitic radiation, harmonics]
- Undesired influence on the equipment:
  - via the antenna input [aerial voltage, input selectivity]
  - via other connected lines
  - by direct radiation

#### **9.3 Measures against interference**

- Measures to prevent and eliminate interference effects:
  - Filtering
  - Decoupling
  - Shielding

## **CHAPTER 10**

### **10. SAFETY**

- The human body
- Mains power supply
- High voltages
- Lightning

**b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES**

**CHAPTER 1**

**1. PHONETIC ALPHABET**

A	=	Alpha	J	=	Julienn	S	=	Sierra
B	=	Bravo	K	=	Kilo	T	=	Tango
C	=	Charlie	L	=	Lima	U	=	Uniform
D	=	Delta	M	=	Mike	V	=	Victor
E	=	Echo	N	=	November	W	=	Whiskey
F	=	Foxtrot	O	=	Oscar	X	=	X-ray
G	=	Golf	P	=	Papa	Y	=	Yankee
H	=	Hotel	Q	=	Quebec	Z	=	Zulu
I	=	India	R	=	Romeo			

## CHAPTER 2

### 2. Q-CODE

Code	Question	Answer
QRK	What is the readability of my signals?	The readability of your signals is ...
QRM	Are you being interfered with?	I am being interfered with
QRN	Are you troubled by static?	I am troubled by static
QRO	Shall I increase transmitter power	Increase transmitter power
QRP	Shall I decrease transmitter power?	Decrease transmitter power
QRT	Shall I stop sending?	Stop sending
QRZ	Who is calling me?	You are being called by ...
QRV	Are you ready?	I am ready
QSB	Are my signals fading?	Your signals are fading.
QSL	Can you acknowledge receipt?	I am acknowledging receipt
QSO	Can you communicate with ... direct?	I can communicate ... direct
QSY	Shall I change to transmission on another frequency?	Change transmission to another frequency
QRX	When will you call again?	I will call you again at ... hours on ... kHz (or MHz)
QTH	What is your position in latitude and longitude (or according to any other indication)?	My position is ... latitude, ... longitude (or according to any other indication)



## **CHAPTER 3**

### **3. OPERATIONAL ABBREVIATIONS AS USED IN THE AMATEUR SERVICE**

BK	Signal used to interrupt a transmission in progress
CQ	General call to all stations
CW	Continuous wave
DE	From, used to separate the call sign of the station called from that of the calling station
K	Invitation to transmit
MSG	Message
PSE	Please
RST	Readability, signal-strength, tone-report
R	Received
RX	Receiver
TX	Transmitter
UR	Your

## **CHAPTER 4**

### **4. INTERNATIONAL DISTRESS SIGNS, EMERGENCY TRAFFIC AND NATURAL DISASTER COMMUNICATION**

Distress signs:

- radiotelegraph ...---... [SOS]
- radiotelephone "MAYDAY"
- International use of the amateur station in the event of national disasters
- Frequency bands allocated to the amateur service and amateur satellite service

## **CHAPTER 5**

### **5. CALL SIGNS**

- Identification of the amateur station
- Use of the call signs
- Composition of call signs
- National prefixes

## **CHAPTER 6**

### **6. IARU BAND PLANS**

- IARU band plans
- Purposes

## **CHAPTER 7**

### **7.1 SOCIAL RESPONSIBILITY OF RADIO AMATEUR OPERATION**

### **7.2 OPERATING PROCEDURES**

## **c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR SERVICE AND AMATEUR SATELLITE SERVICE**

## **CHAPTER 1**

### **1. ITU RADIO REGULATIONS**

- Definition Amateur Service and Amateur Satellite Service
- Definition Amateur station
- Article 25 Radio Regulations
- Status Amateur Service and Amateur Satellite Service
- ITU Radio Regions

## **CHAPTER 2**

### **2. CEPT REGULATIONS**

- Recommendation T/R 61-01
- Temporary use of amateur stations in CEPT countries
- Temporary use of amateur stations in NON-CEPT countries which participate in the T/R 61-01 system

## **CHAPTER 3**

### **3. NATIONAL LAWS, REGULATIONS AND LICENCE CONDITIONS**

- National laws
- Regulations and licence conditions
- Demonstrate knowledge of maintaining a log
  - log keeping
  - purpose
  - recorded data

## **7 Appendix II**

### **7.1 Statutory Instrument 450 of 2002, Wireless Telegraphy (Experimenter's Licence) Regulations, 2002**

**S.I. No. 450 of 2002**

#### **WIRELESS TELEGRAPHY (EXPERIMENTER'S LICENCE) REGULATIONS, 2002**

I, ETAIN DOYLE, Director of Telecommunications Regulation, in exercise of the powers conferred on me by section 6(1) of the Wireless Telegraphy Act, 1926 (No. 45 of 1926), and, section 4 of the Telecommunications (Miscellaneous Provisions) Act, 1996 (No. 34 of 1996), and with the consent of the Minister for Communications, Marine and Natural Resources, pursuant to subsection (8) of the said section 4 and the Communications, Energy and Geological Survey of Ireland (Transfer of Departmental Administration and Ministerial Functions) Order 2002 (No. 300 of 2002) and the Marine and Natural Resources (Alteration of Name of Department and Title of Minister) Order 2002 (No. 307 of 2002), hereby make the following Regulations:

#### **Citation**

1. These Regulations may be cited as the Wireless Telegraphy (Experimenter's Licence) Regulations, 2002.

#### **Revocation**

2. These Regulations revoke the Wireless Telegraphy (Experimenter's Licence) Regulations, 1937 to 1992.

#### **Interpretation**

3. (1) In these Regulations –

“Act of 1926” means the Wireless Telegraphy Act, 1926 (No. 45 of 1926);

“authorised officer” means a person appointed by the Director in writing under Regulation 17 to be an authorised officer for the purpose of these Regulations;

“Director” means the Director of Telecommunications Regulation appointed under the Telecommunications (Miscellaneous Provisions) Act, 1996 (No. 34 of 1996).

“Experimenter” means a person licensed under these regulations who keeps, has possession of, installs, maintains, works or uses apparatus for wireless telegraphy solely for the purposes of conducting experiments, intercommunication and engaging in self training in wireless telegraphy;

“harmful interference” means interference which endangers the functioning of a radionavigation service or other safety services or which otherwise seriously degrades, obstructs or repeatedly interrupts any lawfully operating radio-communications service;

“Irish Radio Transmitters’ Society” means the national society for radio experimenter’s in Ireland and the member society for Ireland of the International Amateur Radio Union (IARU).

“licence” means a licence under section 5 of the Wireless Telegraphy Act, 1926 (No. 45 of 1926), being a licence for a station as defined in these Regulations and cognate words shall be construed accordingly;

“licensee” means the holder of a licence;

“radio-communications service” means a service involving the transmission, emission and/or reception of radio waves specified for specific telecommunications purposes;

“station” means a collection of equipment for Wireless Telegraphy necessary at a location for participating in the amateur service as defined in the Radio Regulations of the International Telecommunications Union;

“suitably qualified person” means a person to whom Regulation 7 applies, and cognate words shall be construed accordingly;

(2) In these Regulations –

- (a) a reference to an enactment or regulation shall be construed as a reference to the enactment or regulation as amended or extended by or under any subsequent enactment or regulation;
- (b) a reference to a regulation or a schedule is to a regulation of, or a schedule to, these Regulations, unless it is indicated that reference to some other enactment is intended;
- (c) a reference to a paragraph or subparagraph is to the paragraph or subparagraph of the provision in which the reference occurs unless it is indicated that reference to some other provision is intended;

(3) The Interpretation Acts, 1937 to 1997, apply to these Regulations.

## **Licences to which these Regulations apply**

4. These Regulations apply to licences to keep, have possession of, install, maintain, work and use apparatus for wireless telegraphy solely for the purposes of conducting experiments and engaging in self training in wireless telegraphy, having the characteristics set out in Part (IV) of the licence and operating in accordance with the technical conditions set out in Part (VI) of the licence.

## **Licence application**

5. (1) An application for a licence shall be in the form and subject to such conditions as shall be specified by the Director from time to time.
  - (2) An applicant for a licence shall, if so requested by the Director, furnish such information as the Director may reasonably require for the purposes of assessing the application, and the Director may refuse to grant a licence to an applicant who fails or refuses to comply with a request under this paragraph, subject to the Licensing Regulations as applicable.
  - (3) (a) Following the assessment of an application the Director may issue a licence to any person but may, subject to any requirements under national and EC law, refuse to issue a licence.
    - (b) In the event of refusal to issue a licence the reason for refusal will be specified and the applicant will have the right of appeal to the Director within 14 days of the date of the refusal

## **Addresses for notices**

6. (1) Where the Licensee is domiciled in the European Union (the “EU”), the Licensee shall on the grant of his or her licence furnish in writing to the Director the home address and, where appropriate, e-mail address, within the EU to which notices and other documents under these Regulations may be delivered or sent by post or by telecommunications services operated in accordance with the Postal and Telecommunications Services Act, 1983 (No. 24 of 1983), to him or her by or on behalf of the Director and shall, as occasion requires, likewise furnish any change of address or e-mail address and such notice or document delivered to, or sent by post, or by such telecommunications services, to such address or e-mail address so furnished shall be deemed for the purposes of these Regulations to have been duly served by the Director.
  
- (2) Where the Licensee is domiciled outside the EU, the Licensee shall furnish in writing an address for service in Ireland.

## **Required knowledge**

7. The Director, before granting a licence, shall be satisfied that;
  - (1) that the applicant has a satisfactory knowledge of the adjustment and operation of the station in respect of which such licence is applied for and
  
  - (2) that the applicant has the ability to send and receive Morse, if applicable, as detailed in the technical conditions under part VI of the licence and
  
  - (3) that the applicant has a satisfactory knowledge of the radio regulations as issued and amended by the International Telecommunications Union.

### **Form of licence**

8. The licence shall be in the form specified in the First Schedule with such variation, if any, (whether by addition, deletion or alteration) as the Director may determine from time to time in accordance with applicable national or EC law.

### **Continuance in force of licences**

9. (1) Subject to the provisions of these Regulations, every annual licence shall, unless previously surrendered by the Licensee, or unless or until it is revoked or renewed by the Director, and subject to any suspension thereof, in accordance with the provisions of these Regulations, continue in force from the date of commencement specified in Part V of the licence until the expiration of the period 12 months after the date of commencement.
- (2) Subject to the provisions of these Regulations, every short-term licence shall, unless previously surrendered by the Licensee, or unless or until it is revoked by the Director, and subject to any suspension thereof, in accordance with the provisions of these Regulations, continue in force from the date of commencement until a date of expiration specified in the licence and this period shall not exceed a period of 3 months in total.

### **Renewal of licences**

10. (1) Subject to the provisions of these Regulations, any requirement under applicable national and EC law and any terms and conditions as may be specified by the Director acting in accordance with her statutory powers under national and EC law, the Director may renew a licence.

- (2) An annual licence which is renewed under this Regulation shall, subject to the provisions of this Regulation and unless previously surrendered by the Licensee, or unless or until it is revoked or again renewed by the Director, and subject to any suspension thereof, continue in force from the date of renewal until the expiration of the period of 12 months after the date of renewal.
- (3) In considering whether to renew an annual licence under this Regulation, the Director shall have regard in particular to:
  - (a) whether the Licensee complied with these Regulations and the conditions attached to the expiring licence pursuant to these Regulations;
  - (b) the management and efficient use of radio spectrum;
  - (c) the avoidance of harmful interference.
- (4) The annual licence shall be renewed upon receipt of the fee as specified the Second Schedule. If the fee is not received on or before the termination date specified in Part V of the licence, the holder of the expired licence shall make an application in full for a new licence.
- (5) A licence shall (unless it has been revoked or renewed) expire on the day following the termination date specified in Part V of the licence.
- (6) The granting or renewal of a licence shall not be construed as warranting that the licence shall be renewed at any time in the future.
- (7) A short term licence shall not be renewed but a further short-term licence may be issued at the discretion of the Director following a reapplication under Regulation 4.



## **Licence fees**

11. (1) Fees as set out and provided for in the Second Schedule are hereby prescribed in relation to licences for the purpose of section 6 of the Wireless Telegraphy Act, 1926 (No. 45 of 1926).
- (2) Any fee paid in respect of a licence pursuant to these Regulations shall not be refundable in the event of revocation, suspension or amendment of the licence pursuant to these Regulations or through the operation of any other law.
- (3) All fees payable under these Regulations shall be paid to the Director of Telecommunications Regulation and shall be so paid in cash, by cheque, money order or postal order, or by such other means as the Director for the time being considers appropriate.

## **Licence conditions**

12. It shall be a condition of a licence that –
  - (1) The station shall be used only on such parts of the radio frequency spectrum as may be specified under Part IV of the licence.
  - (2) The Licensee shall not, assign the licence or any of the powers, duties or functions conferred by it or lease or let the licence or otherwise transfer to another person the benefit or any benefits of the licence.
  - (3) The Licensee shall ensure:
    - (a) that non-ionising radiation emissions from the station operated by the Licensee are within the limits specified by the guidelines published by the International Commission for Non-Ionising Radiation Protection (“ICNIRP”) and that these comply with any radiation emission standards adopted and published by ICNIRP or its successors from time to time, any radiation emission standards of the European Committee for Electrotechnical Standards and any radiation emission standards specified by national and EC law;

- (b) that the station, or any part thereof, shall be installed, maintained, operated and used so as not to cause harmful interference;
- (c) that the installation of the station, or any part thereof is effected, and its maintenance and operation is carried on, in such a manner as to ensure that the safety of persons or property is not endangered;
- (d) that he or she obtains any other approvals, consents, licences, permissions and authorities required by law for the installation, transport, maintenance, work and use of the station to which the licence relates and that he or she complies with any requirements relating to the licensed station under applicable national and EC law;
- (e) that, save as may be required by law, access to, and use of, the station to which the licence relates is restricted to the Licensee, any suitably qualified person or any person operating under the direct supervision of the Licensee;
- (f) that:
  - (i) all transmissions from the station are directly related to the experiments;
  - (ii) all messages are in plain language, and for this purpose recognised abbreviations used in radio communication may be regarded as plain language;
  - (iii) where data transmission modes are used that any communications are unencrypted.
- (g) that when communicating or attempting to communicate with another station, the call sign of the station being communicated with, followed by the Licensee's own call sign are sent;
- (h) that the Licensee's call sign is sent at regular intervals and on every occasion when the frequency is changed.

(4) The Licensee shall -

- (a) where the Director, or his or her authorised officer, is satisfied that the Licensee has failed or is failing, to comply with subparagraphs(3)(b) or (3)(c) of this Regulation and serves on the Licensee a notice pursuant to Regulation 15 and 16 of the Regulations, ensure that the notice is fully complied with;
- (b) only establish communications with stations, which are actually co-operating in the experiments under Regulation 4;
- (c) only establish communications with stations in Ireland and in countries where such communications are permitted;
- (d) take all reasonable measures to prevent any message or information which the Licensee is not authorised to receive, from being received by the station;
- (e) furnish to the Director such information and reports relating to the operation of the station as the Director may, from time to time, by notice in writing served on the Licensee, require;
- (f) keep, for a period of not less than 6 months, all or any records which the Director, from time to time, informs the Licensee that he or she requires to be kept;
- (g) on request from an authorised officer, produce his or her licence for inspection by the authorised officer;
- (h) on request from an authorised officer, permit the authorised officer to inspect any records which the Director requires to be kept or which are kept by the Licensee in connection with the operation of the station to which the licence relates;

- (i) on request from an authorised officer, make available, as specified in Part VI of the licence, the test equipment or apparatus necessary to facilitate testing by the authorised officer of the station or of any apparatus for wireless telegraphy situated therein and any other apparatus associated therewith.
- (5) In accordance with section 11 of the Act of 1926 the licensee or persons under his or her supervision shall not permit or send -
- (a) any communication of an indecent, obscene or offensive character, nor
  - (b) any message or communication subversive of public order, nor
  - (c) any false or misleading signal of distress, nor
  - (d) any false or misleading message, signal, or communication to a ship or other vessel or an aircraft in distress.
- (6) If any message or information, which a Licensee is not authorised to receive, is unintentionally received by means of the station, the Licensee shall not –
- (a) make known, or allow to be made known, its contents, its origin, its destination, its existence or the fact of its receipt to any person other than an authorised officer or member of the Garda Síochána, or
  - (b) reproduce in writing or otherwise, make use of or copy such message or information or allow it to be reproduced in writing, made use of or copied.

## **Enforcement, amendment, revocation and suspension**

13. (1) The Director may amend the licence from time to time.
  - (2) Without prejudice to sub-section (1) of this Regulation, the Director may, after serving notice in writing on the Licensee specifying reasons and after affording the Licensee reasonable opportunity to make representations and after having considered any such representations, suspend, amend, or revoke the licence in any of the following circumstances:
    - (a) where a condition of a licence (including any condition imposed under these Regulations or other relevant enactments) is contravened;
    - (b) where the Licensee fails or refuses to comply with a direction of the Director or hinders or obstructs an authorised officer in the performance of his or her functions;
    - (c) where the application made by the Licensee is or was false or misleading in a material respect;
    - (d) where, in the opinion of the Director, such revocation or suspension is required for the purpose of complying with national or EC law.
14. In addition to any power of revocation or suspension of a licence conferred by these Regulations, the Director may at any time, by notice in Iris Oifigúil, suspend, in whole or part, for such a period as may be specified in the notice, all licences for the time being in force or all such licences in a specified district, where he or she deems this necessary or upon Ministerial direction due to an emergency or in the interest of national security.
15. Notwithstanding any other provision of these Regulations, the Director or an authorised officer may, where he or she is of the opinion that a station, or part thereof, is causing, or is likely to cause, harmful interference, serve on the Licensee a notice, prohibiting the use, or as appropriate requiring that the use of the station, or part thereof, as may be specified in the notice, cease forthwith or, on or before such date and time as may be so specified, and the Licensee shall not use, or as appropriate shall cease to use the station, or part thereof, unless and until such notice has been withdrawn by the Director, or an authorised

officer, and shall otherwise take such measures (if any) as may be specified by the Director, or an authorised officer, in the notice. The Licensee may apply to have the notice withdrawn as soon as the cause or likely cause of the harmful interference has been remedied.

## **Compliance**

16. (1) Subject to the provisions of these Regulations and any requirement under applicable national or EC law, the Licensee shall comply with any direction, requirement or notice given to him or her by or on behalf of the Director in respect of any matter which direction, requirement or notice, is in the opinion of the Director, appropriate having regard to the functions of the Director.
- (2) Without prejudice to the generality of paragraph (1), the Licensee shall comply with any direction, requirement or notice given to him or her by or on behalf of the Director in respect of the use or the cessation of use of any frequency band or part thereof, or in respect of an amendment to any characteristics used in the operation of a station, as particularised in Part IV of the licence.

## **Authorised Officers**

17. (1) The Director may appoint such members of the staff of the Director as he or she considers appropriate to be authorised officers for the purpose of these Regulations.
- (2) Without prejudice to any other functions or powers of authorised officers under these Regulations an authorised officer shall in respect of licences issued under these Regulations have the equivalent powers and obligations as conferred on them as an Authorised Officer under the Telecommunications (Miscellaneous Provisions) Act, 1996 (No. 34 of 1996) or such other legislation as may be enacted from time to time.
- (3) An authorised officer when exercising the functions and powers conferred on him or her by these Regulations shall, upon request by the Licensee, produce his or her certificate of appointment.

## **FIRST SCHEDULE**

### **Wireless Telegraphy Act, 1926 Wireless Telegraphy (Experimenter's Licence) Regulations, 2002**

**Licence under Section 5 of the Wireless Telegraphy Act, 1926, to keep, have possession of, install, maintain, work and use apparatus for wireless telegraphy solely for the purpose of conducting experiments and engaging in self training in wireless telegraphy.**

I, ETAIN DOYLE, Director of Telecommunications Regulation, in the exercise of the powers conferred on me by section 5(1) of the Wireless Telegraphy Act, 1926, and Section 4 of the Telecommunications (Miscellaneous Provisions) Act, 1996 (No. 34 of 1996) grant to the Licensee specified in Part I of this licence authorisation to keep, have possession of, install, maintain, work and use apparatus for wireless telegraphy for the sole purpose of conducting experiments and engaging in self training in wireless telegraphy having the characteristics described in Part IV of this licence and subject to the terms and conditions as set out in the licence and prescribed by the Regulations and any other applicable provision of national or EC law.

1. This licence shall come into operation and terminate on the dates specified in Part V and shall, unless previously surrendered by the Licensee or unless or until it is revoked or renewed by the Director, and subject to any suspension thereof, continue in force from the commencement date until the termination date.
2. Where the Licensee is domiciled in the European Union (the "EU"), the Licensee shall on the grant of his or her licence furnish in writing to the Director the address and, where appropriate, e-mail address, within the EU to which notices and other documents under this licence may be delivered or sent by post or by telecommunications services operated in accordance with the Postal and Telecommunications Services Act, 1983 (No. 24 of 1983), to him or her by or on behalf of the Director and shall, as occasion requires, likewise furnish any change of address or e-mail and such notice or document delivered to, or sent by post, or by such telecommunications services, to such address or e-mail address so furnished shall be deemed for the purposes of this licence to have been duly served by the Director.
3. Where the Licensee is domiciled outside the EU, the Licensee must furnish in writing an address for service in Ireland.
4. The Licensee shall comply with the technical conditions set out in Part VI and with any alterations or additions thereto notified to the Licensee in writing by or on behalf of the Director.

5. It shall be a condition of the licence that:-

- (1) The station shall be used only on such parts of the radio frequency spectrum as may be specified under part IV of the licence.
- (2) The Licensee shall not, assign the licence or any of the powers, duties or functions conferred by it or lease or let the licence or otherwise transfer to another person the benefit or any benefits of the licence.
- (3) The Licensee shall ensure -
  - (a) that non-ionising radiation emissions from the station operated by the Licensee are within the limits specified by the guidelines published by the International Commission for Non-Ionising Radiation Protection (“ICNIRP”) and that these comply with any radiation emission standards adopted and published by ICNIRP or its successors from time to time, any radiation emission standards of the European Committee for Electrotechnical Standards and any radiation emission standards specified by national and EC law;
  - (b) that the station, or any part thereof, shall be installed, maintained, operated and used so as not to cause harmful interference;
  - (c) that the installation of the station, or any part thereof is effected, and its maintenance and operation is carried on, in such a manner as to ensure that the safety of persons or property is not endangered;
  - (d) that he or she obtains any other approvals, consents, licences, permissions and authorities required by law for the installation, transport, maintenance, work and use of the station to which the licence relates and that he or she complies with any requirements relating to the licensed station under applicable national and EC law;
  - (e) that, save as may be required by law, access to, and use of, the station to which the licence relates is restricted to the Licensee, any suitably



qualified person or any person operating under the direct supervision of the Licensee;

- (f) that:
    - (i) all transmissions from the station are directly related to the experiments;
    - (ii) all messages are in plain language, and for this purpose recognised abbreviations used in radio communication may be regarded as plain language;
    - (iii) where data transmission modes are used that any communications are unencrypted.
  - (g) that when communicating or attempting to communicate with another station, the call sign of the station being communicated with, followed by the Licensee's own call sign are sent;
  - (h) that the Licensee's call sign is sent at regular intervals and on every occasion when the frequency is changed.
- (4) The Licensee shall -
- (a) where the Director, or his or her authorised officer, is satisfied that the Licensee has failed or is failing, to comply with subparagraphs (3)(b) or (3)(c) of these licence conditions and serves on the Licensee a notice pursuant to Regulation 15 and 16 of the Regulations, ensure that the notice is fully complied with;
  - (b) only establish communications with stations, which are actually co-operating in the experiments under Regulation 4;
  - (c) only establish communications with stations in Ireland and in countries where such communications are permitted;

- (d) take all reasonable measures to prevent any message or information which the Licensee is not authorised to receive from being received by the station;
  - (e) furnish to the Director such information and reports relating to the operation of the station as the Director may, from time to time, by notice in writing served on the Licensee, require;
  - (f) keep, for a period of not less than 6 months, all or any records which the Director, from time to time, informs the Licensee that he or she requires to be kept;
  - (g) on request from an authorised officer, produce his or her licence for inspection by the authorised officer;
  - (h) on request from an authorised officer, permit the authorised officer to inspect any records which the Director requires to be kept or which are kept by the Licensee in connection with the operation of the station to which the licence relates;
  - (i) on request from an authorised officer, make available, as specified in Part VI of the licence, the test equipment or apparatus necessary to facilitate testing by the authorised officer of the station or of any apparatus for wireless telegraphy situated therein and any other apparatus associated therewith.
- (5) In accordance with section 11 of the act of 1926, the licensee or persons under his or her supervision shall not permit or send -
- (a) any communication of an indecent, obscene or offensive character, nor
  - (c) any message or communication subversive of public order, nor
  - (d) any false or misleading signal of distress, nor
  - (e) any false or misleading message, signal, or communication to a ship or other vessel or an aircraft in distress.

- (6) If any message or information which a Licensee is not authorised to receive is unintentionally received by means of the station,  
the Licensee shall not -
  - (a) make known, or allow to be made known, its contents, its origin, its destination, its existence or the fact of its receipt to any person other than an authorised officer or member of the Garda Síochána, or
  - (b) reproduce in writing or otherwise, make use of or copy such message or information or allow it to be reproduced in writing, made use of, or copied.
  
- 6. (1) The Director may amend the licence from time to time.
  
- (2) Without prejudice to Paragraph 7 of the licence and Regulation 13 and subsection (1) of this Paragraph, the Director may, after serving notice on the Licensee specifying reasons and after affording the Licensee reasonable opportunity to appeal and after having considered any such appeal, suspend amend or revoke the licence in any of the following circumstances:
  - (a) where a condition of a licence (including any condition imposed under the Regulations or other relevant enactments) is contravened;
  - (b) where the Licensee fails or refuses to comply with a direction of the Director or hinders or obstructs an authorised officer in the performance of his or her functions;
  - (c) where the application made by the Licensee is or was false or misleading in a material respect;
  - (d) where, in the opinion of the Director, such revocation or suspension is required for the purpose of complying with national or EC law;
  
- 7. Notwithstanding any other provision of the licence, the Director or an authorised officer may where he or she is of the opinion that a station, or part thereof, is causing, or is

likely to cause, harmful interference, serve on the Licensee a notice, prohibiting the use, or as appropriate requiring that the use of the station, or part thereof, as may be specified in the notice, cease forthwith or, on or before such date and time as may be so specified, and the Licensee shall not use, or as appropriate shall cease to use the station, or part thereof, unless and until such notice has been withdrawn by the Director, or an authorised officer, and shall otherwise take such measures (if any) as may be specified by the Director, or an authorised officer, in the notice. The Licensee may apply to have the notice withdrawn as soon as the cause or likely cause of the harmful interference has been remedied.

8. (1) Subject to the provisions of these Regulations and any requirement under applicable national or EC law, the Licensee shall comply with any direction, requirement or notice given to him or her by or on behalf of the Director in respect of any matter which direction, requirement or notice is, in the opinion of the Director, appropriate having regard to the functions of the Director.
- (2) Without prejudice to the generality of paragraph (1), the Licensee shall comply with any direction, requirement or notice given to him or her by or on behalf of the Director in respect of the use or the cessation of use of any frequency band or part thereof, or in respect of an amendment to any characteristics used in the operation of a station, as particularised in Part IV of the licence.

9. In this licence –

“Act of 1926” means the Wireless Telegraphy Act, 1926 (No. 45 of 1926);

“authorised officer” means a person appointed by the Director in writing under Regulation 17 to be an authorised officer for the purpose of this licence;

“Director” means the Director of Telecommunications Regulation appointed under the Telecommunications (Miscellaneous Provisions) Act, 1996 (No. 34 of 1996).

“Experimenter” means a person licensed under these regulations who keeps, has possession of, installs, maintains, works or uses apparatus for wireless telegraphy solely for the purposes of conducting experiments, intercommunication and engaging in self training in wireless telegraphy;

“harmful interference” means interference which endangers the functioning of a radionavigation service or other safety services or which otherwise seriously degrades, obstructs or repeatedly interrupts any lawfully operating radio-communications service;

“Irish Radio Transmitters’ Society” means the national society for radio experimenter’s in Ireland and the member society for Ireland of the International Amateur Radio Union (IARU).

“licence” means a licence under section 5 of the Wireless Telegraphy Act, 1926 (No. 45 of 1926), being a licence for a station as defined in the licence and cognate words shall be construed accordingly;

“Licensee” means the holder of a licence;

“radio-communications service” means a service involving the transmission, emission and/or reception of radio waves specified for specific telecommunications purposes;

“station” means a collection of equipment for Wireless Telegraphy necessary at a location for participating in the amateur service as defined in the Radio Regulations of the International Telecommunications Union;

“suitably qualified person” means a person to whom Regulation 6 applies, and cognate words shall be construed accordingly;

PARTS

Part I

Licensee

Part II

Addresses for Notices

Part III

Type of Licence

Part IV

Particulars of Experimenter's Station

Part V

Licence Commencement and Termination Dates

Part VI

Technical Conditions of Experimenter's Station



## **EXPLANATORY NOTE**

*(This note is not part of the Instrument and does not purport to be a legal interpretation.)*

These Regulations provide for the issue of annual and short-term licences for apparatus for wireless telegraphy used for the purposes of conducting experiments and engaging in self-training in wireless telegraphy.

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