



European Radiocommunications Committee (ERC)  
within the European Conference of Postal and Telecommunications Administrations (CEPT))

**AMATEUR RADIO NOVICE EXAMINATION SYLLABUS AND  
AMATEUR RADIO NOVICE EXAMINATION CERTIFICATE WITHIN CEPT AND  
NON-CEPT COUNTRIES**

**Helsinki, September 2005**

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## **1 INTRODUCTION**

The CEPT Recommendation T/R 61-02 (Chester 1990, revised Nicosia 1994), makes it possible for CEPT administrations to issue a Harmonised Amateur Radio Examination Certificate (HAREC). This Certificate shows proof of successfully passing an amateur radio examination that complies with the Examination Syllabus for HAREC. It facilitates the issuing of an individual licence to a radio amateur returning to his native country showing this document issued by a foreign CEPT Administration after passing an amateur radio examination in that foreign country.

The developing of the CEPT Recommendation T/R 61-02 was possible because national amateur licences and the national amateur examinations in the CEPT countries were based on the similar starting points.

Due to the high level standard of the technical theory of the examination syllabus, it was suggested by some CEPT administrations to develop an ERC Report for a lower level examination suitable for the amateur radio novice class licence. A reason to establish an ERC Report on this topic is the uncertainty of the establishing and/or the implementation of the novice class licence by several CEPT administrations.

## **2 AMATEUR RADIO NOVICE EXAMINATION SYLLABUS**

The argument to initiate an Amateur Radio Novice Class can be formulated with the following target groups in mind: for youth with technical interest; older or retired people with interest in electronics who want just to experiment with small transmitters; and candidates who do not have the educational background to cope with the higher examination levels, but are interested in experiments with transmitters. The Amateur Radio Novice Class permits the experience with anomalous propagation modes, digital transmission modes in combination with computer techniques, antenna experiments, home construction of equipment, operating practice.

The International Amateur Radio Union (IARU) was requested to submit a proposal concerning an acceptable lower level examination(s) suitable for a (harmonised) amateur radio novice class. Owing to differences in existing National Radio Regulations, it was not possible to achieve a common consensus for creating an Amateur Radio Novice Class with the appropriate lower examination standard

It was therefore decided that the amateur radio novice examination syllabus and the amateur radio novice examination certificate, given in this report, could be used as a guideline for National administrations wishing to introduce a new or change the national amateur radio novice class licence.

Besides, each CEPT and NON-CEPT Administration may decide to recognise novice class licences granted by other administrations to allow holders of national amateur radio novice licences to obtain a similar class licence, based on this report. The national amateur radio novice examination syllabus should contain at least technical, operational and regulatory elements. Emphasis may be put on a practical examination together with operating practice as is usual on the amateur bands. The proposed amateur radio novice examination syllabus is shown in Annex 2.

### 3 PROCEDURE FOR ISSUING AN AMATEUR RADIO NOVICE LICENCE AND EXAMINATION CERTIFICATE

This ERC report suggests a procedure for issuing an Amateur Radio Novice Examination Certificate (Annex 1), and the criteria for the National Novice Examination.

Appropriate conditions for the Amateur Radio Novice Licence shall be at the discretion of National administrations.

#### 3.1 Issuing an Amateur Radio Novice Examination certificate

An Amateur Radio Novice Examination Certificate may be issued by administrations to persons who have passed a national Novice examination that meets the criteria set out in paragraph 3.2 below.

#### 3.2 Criteria for national amateur radio novice examination

The national amateur radio novice examination should cover the subjects that a radio amateur may counter in conducting tests with an amateur station and with its operation, and shall include at least:

*Technical, operational and regulatory matters*  
(see the Novice Examination syllabus annex 2)

- a) TECHNICAL CONTENT
  - 1. Electrical, Electro-Magnetic and Radio Theory
  - 2. Components
  - 3. Circuits
  - 4. Receivers
  - 5. Transmitters
  - 6. Antennas and Transmission Lines
  - 7. Frequency spectrum and propagation
  - 8. Measurements
  - 9. Interference and Immunity
  - 10. Safety
- b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES
  - 1. Phonetic Alphabet
  - 2. Q-code (as far as radio amateur traffic is concerned)
  - 3. Operational Abbreviations
  - 4. Call signs
- c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO SATELLITE SERVICE
  - 1. ITU Radio Regulations
  - 2. CEPT Regulations
  - 3. National laws, regulations and licence conditions

#### 3.3 The Amateur Radio Novice Examination Certificate

The Amateur Radio Novice Examination Certificate should 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 for a CEPT novice examination level certificate
- b) the holder's name and date of birth
- d) the date of issue
- e) the issuing authority

This document may take the form as set out in Annex 1.

ANNEX 1

AMATEUR RADIO NOVICE EXAMINATION CERTIFICATE

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 novice examination which fulfils the requirements laid down by the International Telecommunications Union (ITU). The passed examination corresponds to the examination described in ERC Report 32.
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 le rapport "ERC Report 32"
3. Die ausstellende Verwaltung oder zuständige Behörden \_\_\_\_\_ 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 im ERC Report 32 beschriebenen Prüfung.
4. Officials requiring information about this certificate should address their enquiries to the issuing national Authority or the issuing Administration as indicated above.
5. Les autorités officielles désirant des informations sur ce document devront adresser leurs demandes à l'Autorité nationale compétente mentionnée ci-dessous.
6. Behörden, die Auskünfte über diese Bescheinigung erhalten möchten, sollten ihre Anfragen an die genannte ausstellende nationale Behörde oder die ausstellende Verwaltung richten.
7. Address/Adresse/Anschrift

\_\_\_\_\_

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

Telex/Téléx/Telex: \_\_\_\_\_

Telefax/Téléfax/Telefax: \_\_\_\_\_

Signature  
Signature  
Unterschrift

Official stamp  
Cachet officiel  
Offizieller Stempel

## ANNEX 2

## EXAMINATION SYLLABUS FOR AMATEUR RADIO NOVICE EXAMINATION LEVEL

## INTRODUCTION

This syllabus has been produced for the **guidance** of administrations so that they may prepare their national amateur radio examinations for the amateur radio novice examination Certificate.

The scope of the examination is limited to subjects relevant to tests and experiments with 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;
  - squaring;
  - square roots.
- d) Candidates must be familiar with the formulae used in this syllabus and be able to transpose them.

- a) TECHNICAL CONTENT

1. ELECTRICAL, ELECTRO-MAGNETIC AND RADIO THEORY

- 1.1 Conductivity
- 1.2 Sources (of electricity)
- 1.3 Radio Waves
- 1.4 Audio and digital signals
- 1.5 Modulated signals
- 1.6 Power

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 Tuned circuits

3. CIRCUITS

- 3.1 Filters

4. RECEIVERS

- 4.1 Types
- 4.2 Block diagrams
- 4.3 Operation and function

5. TRANSMITTERS

- 5.1 Block diagrams
- 5.2 Operation and functions
- 5.3 Transmitter characteristics

6. ANTENNAS AND TRANSMISSION LINES
    - 6.1 Antenna types (physical construction, directional properties and polarisation only)
    - 6.2 Methods of feeding antenna
    - 6.3 Matching
  7. FREQUENCY SPECTRUM AND 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
    - 10.1 The human body
    - 10.2 Mains power supply
    - 10.3 Dangers
    - 10.4 Lightning
- b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES
1. Phonetic alphabet
  2. Q-Code
  3. Operational Abbreviations as used in the Amateur Service
  4. Call signs
- c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO SATELLITE SERVICE
1. ITU Radio Regulations
  2. CEPT Regulations
  3. National laws, Regulations and Licence Conditions

**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 ( $E=I.R$ ).
    - Electric power ( $P=E.I$ ).
    - The unit watt.
  - 1.2 Sources (of electricity)
    - Battery and mains.
  - 1.3 Radio Waves
    - Radio waves as electromagnetic waves.
    - Propagation velocity and its relation with frequency and wavelength
    - Polarisation.
    - Frequency.
    - The unit hertz.

#### 1.4 Audio and digital signals

- Audio signals.
- Digital signal,

#### 1.5 Modulated signals

Advantages and disadvantages of:

- Amplitude modulation.
- Single-sideband modulation.
- Frequency modulation.
- Carrier, sidebands and bandwidth.

#### 1.6 Power

- DC-input power and RF-output power.

## CHAPTER 2

### 2. COMPONENTS

#### 2.1 Resistor

- Resistance.
- The unit ohm.
- Power dissipation.
- Colour code.
- Resistors in series and parallel.

#### 2.2 Capacitor

- Capacitance.
- The unit farad.
- Use of fixed and variable capacitors: air, mica, plastic, ceramic and electrolytic capacitors.
- Capacitors in parallel.

#### 2.3 Coil

- The unit henry.

#### 2.4 Transformers application and use

- Transformers (application).

#### 2.5 Diode

- Use and application of diodes:
- Rectifier diode, zener diode.

#### 2.6 Transistor

- Know that a transistor can be used as amplifier or oscillator.

#### 2.7 Tuned circuits

- Functions of series and parallel tuned circuits.

## CHAPTER 3

### 3. CIRCUITS

#### 3.1 Filters

- Low-pass, high-pass, band-pass and band-stop filters use and application only.

## CHAPTER 4

### 4. RECEIVERS

#### 4.1 Types

- Single superheterodyne receiver.
- Straight or t.r.f receivers.

#### 4.2 Block diagrams

- CW receiver (A1A).
- AM receiver (A3E).
- SSB receiver (J3E).
- FM receiver (F3E).

#### 4.3 Operation and function of the following stages

##### (Block diagram treatment only)

- HF amplifier.
- Oscillator (fixed and variable).
- Mixer.
- Intermediate frequency amplifier.
- Detector.
- Beat frequency oscillator (BFO).
- LF amplifier.
- Power supply.
- Squelch (purpose only).

## CHAPTER 5

### 5. TRANSMITTERS

#### 5.1 Block diagrams

- CW transmitter (A1A).
- SSB transmitter (J3E).
- FM transmitter (F3E).

#### 5.2 Operation and functions of the following stages

##### (Block diagram treatment only)

- Mixer.
- Oscillator (crystal and VFO).
- Buffer.
- Driver.
- Frequency multiplier.
- Power amplifier.
- Output filter (pi-filter).
- Frequency modulator.
- SSB modulator.
- Power supply.

#### 5.3 Transmitter characteristics (simple description)

- Frequency stability.
- RF-bandwidth.
- Sidebands.
- Output power.
- Spurious, harmonics.



## CHAPTER 6

### 6. ANTENNAS AND TRANSMISSION LINES

#### 6.1 Antenna types (physical construction, directional properties and polarisation only)

- Centre fed half-wave antenna.
- End fed antenna.
- Quarter-wave vertical antenna (ground plane).
- Antenna with parasitic elements (Yagi).
- Radiated power [ERP, EIRP]

#### 6.2 Methods of feeding antenna

- Coaxial cable and twin feeder:
- Advantages and disadvantages;
- Construction and use.

#### 6.3 Matching

- Antenna tuning units (purpose only).

## CHAPTER 7

### 7. FREQUENCY SPECTRUM AND PROPAGATION (simple description only)

- Ionospheric layers.
- The effect of the ionospheric layers on HF propagation.
- Fading.
- Troposphere.
- The effect of the weather conditions on VHF/UHF propagation.
- Sunspot cycle and effect on communication.
- HF, VHF, UHF ranges.
- Relationship between frequency and wavelength.

## CHAPTER 8

### 8. MEASUREMENTS

#### 8.1 Making measurements

Measurement of:

- DC and AC voltage.
- DC and AC current.
- Resistance.
- DC and RF power.
- Frequency.

#### 8.2 Measuring instruments

Making measurements using:

- Multi-range meter (digital and analog).
- Standing Wave Ratio meter.
- Absorption wavemeter.
- Dummy load.

## CHAPTER 9

### 9. INTERFERENCE AND IMMUNITY

#### 9.1 Interference in electronic equipment

- Interference with the desired signal TV, VHF and broadcasting).
- Interference with audio systems.

#### 9.2 Cause of interference in electronic equipment

- Spurious radiation of the transmitter (parasitic radiation, harmonics).
- Undesired influence on the equipment:
  - via the receiver antenna input;
  - via other routes (mains, speaker and connecting leads);
  - by direct radiation.

#### 9.3 Measures against interference

Measures to prevent and minimise interference:

- Filtering at the amateurstation.
- Filtering at the interfered apparatus.
- Decoupling.
- Shielding.
- Separation of transmitting and TV antennas.
- Avoid use of end-fed antenna.
- Minimum power.
- Good RF earth.
- Social effects (good relation with neighbours).

## CHAPTER 10

### 10. SAFETY

#### 10.1 The human body

- The consequences of electrical shock.
- Precaution against electrical shock.

#### 10.2 Mains power supply

- Difference between line, neutral and earth (colour code).
- Importance of good ground connections.
- Quick and slow fuses, values of fuses.

#### 10.3 Dangers

- High voltages.
- Charged capacitors.

#### 10.4 Lightning

- Danger.
- Protection.
- Grounding of equipment.

b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES

CHAPTER 1

1. PHONETIC ALPHABET

A = Alpha	J = Juliet	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

<i>Code</i>	<i>Question</i>	<i>Answer</i>
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
QRS	Shall I send more slowly?	Send more slowly
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
R	Received
RX	Receiver
TX	Transmitter
UR	Your

**CHAPTER 4**

**4. CALL SIGNS**

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

**c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO 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**

- ECC Recommendation (05)06
- Temporary use of amateur stations in CEPT countries
- Temporary use of amateur stations in non-CEPT countries which participate in the CEPT Novice Radio Amateur Licensing 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 of log.
- Recorded data in log.