
# Amateur Radio Handbook

*Revised in 2018*

# TABLE OF CONTENTS

## INTRODUCTION

1. This booklet is an introductory guide for persons who wish to operate an amateur radio station in Barbados. It contains the examination requirements, operating procedures and licensing conditions. The booklet also contains extracts of the general licence conditions on the Amateur Service prescribed in the Amateur Radio Regulations.

2. The Amateur Service is a radio-communication service for the purpose of self-training, inter-communication 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.

3. To obtain a Barbados' amateur station licence which authorizes him/her to establish and operate a station, the applicant must first satisfy the Ministry responsible for Telecommunication in Barbados (hereinafter referred to as the Ministry) that he/she has the necessary qualifications and skills to operate an amateur station without causing any radio interference to other users or radio services.

4. A licence is required for each class. The Chief Telecommunications Officer reserves the right to grant, renew, cancel or withdraw any licence at any time by specific notice in writing to the licencee or by means of a general notice in the local newspaper.

# *PART A*

## *DETAILS OF RADIO AMATEUR LICENCE CLASSES*

### 1. FOUNDATION LICENCE

This licence is the entry – level class. Privileges are limited, but they allow for experiencing what Amateur Radio has to offer.

a. Up to 100 watts transmitter power level is permitted.

b. All modes of transmission are permitted except Morse Code/CW; however, Morse Code/CW is permitted if a Morse Code/CW test of 5 words/minute is passed. Otherwise, this test is not required for this licence.

c. The amateur radio call sign prefix for this class licence is 8P4 which is followed by a unique one, two or three letter suffix which is assigned by the Chief Telecommunications Officer.

d. Operation is permitted only on the 80, 40, and 2 meter bands.

### 2. INTERMEDIATE LICENCE

a. Up to 100 Watts output power is permitted

b. All modes of transmission are permitted except Morse Code/CW; however, Morse Code/CW is permitted if a Morse Code/CW test of 5 words/minute is passed. Otherwise this test is not required for this licence.

c. The amateur radio call sign prefix for this class of licence is 8P5 which is followed by either a unique one, two or three letter suffix which is assigned by the Chief Telecommunications Officer.

d. Operation is permitted only between 160 and 2 meter bands.

## 3. ADVANCED LICENCE

a. Up to 500 Watts output power is permitted.

b. All modes are permitted

c. A 5 words-per-minute Morse test is REQUIRED for this licence

d. Operation is permitted on all bands.

e. The amateur radio call sign prefix for this class of licence is 8P6 which is followed by either a unique one, two or three letter suffix assigned by the Chief Telecommunications Officer.

# *PART B*

## *RADIO AMATEURS' EXAMINATION*

The Radio Amateurs Examination consists of a written examination and may include a Morse Code/CW test where applicable. The written examinations will be based on a suite of Syllabi and Examinations for each class of licence. The questions will be derived either from the Telecommunications Unit's, the Radio Society of Great Britain's (RSGB) or the Amateur Radio Relay League's (ARRL) question pools.

*General Information - Written Examination*

The Radio Amateurs' Written Examination consists of multiple-choice questions based on the material in the Telecommunications Unit's syllabus relating to the class of licence that the applicant is seeking:

Foundation Licence Syllabus - See Appendix 3

Intermediate Licence Syllabus - See Appendix 4

Advanced Licence Syllabus - See Appendix 5

The Written and Morse Examinations are administered by members of the Amateur Radio Society of Barbados in association with personnel from the Telecommunication's Unit at their discretion. The Syllabi, location of the examinations and dates are available from the Telecommunications Unit's office.

*General Information - Morse Code/CW Test*

The Morse Code/CW test with a sending and receiving speed of 5 words/minute is based on the following conditions:

In the sending tests a candidate is required to send 15 words (averaging five letters per word) in plain language in <u>three minutes</u> without uncorrected error, not more than four corrections being permitted, and, 10 five-figure groups in 1½ minutes without uncorrected error, not more than two corrections being permitted.

The accuracy of signaling, the correct formation of characters and the correctness of spacing are taken into account. The wearing of headphones is permitted during the sending test.

In the receiving tests, a candidate is required to receive 15 words (averaging five letters per word) in plain language in three minutes and five-figure groups in 1½ minutes. Each letter or figure incorrectly received counts as one error. A word in which more than one letter is incorrectly received counts as two errors. More than four errors, in 'plain language' and more than two errors in the 'figure test' will result in failure.

The tests will not include any punctuation or other symbols. The foregoing particulars are summarized in the following table:

**TABLE**

| (PRIVATE) TYPE | LENGTH OF TEST | DURATION OF TEST | SENDING | | RECEIVING |
|---|---|---|---|---|---|
| | | | MAX NO. OF CORRECTIONS | MAX NO. OF UNCORRECTED ERRORS | MAX NO. OF ERRORS |
| Plain Language | 15 words (average 5 letters per word) | 3 minutes | 4 | 0 | 4 |
| Figure | To groups | 1½ minutes | 2 | 0 | 2 |

*Statement of Results*

The Telecommunications Unit will send a statement of the results to every candidate who has sat the appropriate Radio Amateurs' Examination and where applicable the Practical Morse Code/CW Test.

*Validity of Statement of Results*

If a licence applicant passes the appropriate Radio Amateurs Examination and where applicable the Practical Morse Code/CW test, normally there will not be a requirement to pass either the Radio Amateurs Examination or the Practical Morse Code/ CW test, it will have to be taken again but not the appropriate Radio Amateur's Examination.

## PART C

### *Radio Amateur's Examination Schedule and General Information*

Frequency and dates of examination:

| | | |
|---|---|---|
| (a) | Written examination | Quarterly, or on request |
| (b) | Practical Morse Test | Quarterly, or on request |

Place of Examination: Inquire of Telecommunications Unit

Notice of Examination: Inquire of Telecommunications Unit

Qualifying Grade: Candidates must score at least 70% to pass on the written exam.

Exemptions from having to be Examined for a licence:

(i) City and Guilds of London Institute Radio Amateur Certificate. (*Part 1only*)

(ii) Amateurs who have valid Amateur Radio Licences issued by a competent authority and possess Radio Amateur Qualifications which are acceptable to the Ministry.

(iii) A recognized degree or its equivalent In Electronics/Communication/ Electrical Engineering which covered the subject contained in the appropriate Radio Amateur Examination.

Examinations Fees: There is a $20.00 Barbados fee for the exam at this time. This is subject to change.

| | |
|---|---|
| Purpose of Examination: | To qualify candidates for the Amateur Radio Station Licences issued by the Ministry. |
| Qualification of Candidates: | (i) Candidates may apply for the appropriate Radio Amateur station Licence, regardless whether or not they have attended a course.<br><br>(ii) A statement of result will be issued to every candidate who had sat for the Radio Amateur Examination and/or Morse Code/CW Test.<br><br>(iii) Candidates who have passed the Radio Amateur Examination may apply for the Amateur Station Licence. |

## *PART D*

## *Application for Amateur Radio Station Licence*

### 1.1 **General Information**

The Ministry may issue Amateur Radio Licences to qualified persons interested in the operation of radio transmitting and receiving equipment and the furtherance of radio-communication techniques in general.

Every applicant for an Amateur Radio Station Licence must pass the Radio Amateurs' Examination or holds an amateur's qualification which is acceptable to the Ministry.

The Ministry may refuse to issue an Amateur Radio Station Licence to any applicant, even though he may have satisfied the examination requirements or possess the necessary qualifications, without assigning any reason therefor.

### 1.2 **Details of Application**

When the applicant has passed the written exam for the appropriate Amateur Radio Station Licence and Morse Code/CW Test, he should complete the Application Form for Amateur Radio Station Licence, and forward it to the Ministry, with the following documents:

(a) citizenship status

(b) statement of results of appropriate Amateur Radio Written Examination and where applicable, the Morse Code/CW Test (or other Radio Amateur Qualifications.)

(c) if you have a radio amateur certificate issued by a competent authority, a photocopy of the certificate

The applicant is advised not to proceed with the purchase of the equipment or installation of the station until his application for a licence has been approved. All radio amateur equipment to be

used in a licenced amateur station must be approved by the Ministry.

### 1.3 **Licence Renewal**

The renewal licence fees are specified in the Radio Amateur Regulations. The fee payable under these Regulations shall be paid in advance. The licence is renewable annually and the fee must be paid by January 1 of each year. Supplementary endorsements are issued after the first year of licensing.

### 1.4 **Conditions for the issue of Amateur Radio Station Licence**

To qualify for a licence, the applicant must

(a) be over 18 years of age; where the applicant is under the age of 18 years, his application for licence must be counter-signed by the applicant's parent, guardian or by any other person approved by the Government and who shall be responsible for the observance of the conditions of the licence.

(b) have passed the written part of the Radio Amateurs' Examination and if appropriate, the Morse Code/CW test conducted by the Amateur Radio Society of Barbados with the presence of Telecommunications Unit's personnel at their discretion, or possess a radio amateur qualification which is acceptable to the Ministry or a valid radio amateur licence issued by a competent authority.

(c) the radio amateur equipment is of a type that is approved by the Ministry.

## PART E

## *RADIO AMATEUR REGULATIONS*

1. **The Radio Amateur Regulations**

   The licencee shall observe and comply with the relevant provisions of the Radio Amateur Regulations and any amendments made thereof.

2. **International Requirement**

   The licencee shall observe and comply with the relevant provisions of the International Telecommunications Convention of the International Telecommunications Union.

3. **Display of Licence**

   The amateur station licence shall be displayed, in close proximity of the equipment, at the station's licenced address.

4. **Frequency Bands and Classes of Emission**

   The various frequency bands which are assigned for use by Radio Amateur Stations **shall** be at the discretion of the Ministry but within the limits prescribed by the Barbados Telecommunications Act for each Class of licence *(see item 18 below)* and the Telecommunications Convention of the International Telecommunications Union. The Ministry has waived the frequency application and procession fees and the annual fees for use of a frequency in operating a Radio Amateur station.

5. **Transmitting Power**

   The maximum permissible power from a Radio Amateur transmitter shall be at the discretion of the Ministry and it shall be specified in the particular class of licence (*See Item 18 below*). The power should be measured by an accurate radio frequency power meter which is connected to antenna terminal on the transmitter and in no case shall the power level exceed the levels as indicated in Item 18 below.

6. **Operational Conditions**

A licencee shall observe the following conditions:

(a) the licenced station shall only be operated at locations approved by the Ministry as shown in the licence.

(b) the station shall in all cases be operated by the licencee or by other licenced amateurs in the presence of the licencee, or, in the case of a training institution, by members of such institution in the presence of the licencee. The licencee will at all times be responsible for the proper operations of the station.

(c) the tuning of the transmitter shall be accomplished by methods which ensure a high degree of accuracy and all emissions shall be maintained within the authorized bands so that no appreciable energy is radiated on any frequency outside the limits of the authorized bands.

(d) a satisfactory method of frequency stabilization shall be employed in the sending equipment comprised in the station. Equipment shall be provided capable of verifying that the sending equipment comprised in the station is operating with emissions within the authorized bands.

(e) the station shall always be equipped with receiving as well as transmitting equipment.

(f) all equipment used or intended to be used by the licencee shall be erected, fixed, placed and used, so as not to interfere with the efficient and convenient working of other authorized stations.

(g) the licencee shall seek the approval of the Ministry in writing of any change of equipment, antenna installation, location and address of the licencee.

(h) the licencee shall be identified by the transmission of a call sign assigned to him by the Ministry at the beginning and end of each period of transmission.

7. **Transmission, Procedure & Limitation**

a) No licencee shall call or transmit to any station other than a licenced Amateur Radio station unless the Minister so approves.

b) The Minister may, in exceptional circumstances,

(i) require a licencee to transmit a message.

(ii) prohibit the licencee from transmitting messages to other stations.

(iii) permit the licencee to transmit and receive messages during local, regional and international emergencies and disasters.

c) A licencee shall ensure that;

(i) an uninterrupted period of transmission from a station does Not exceed 10 minutes.

(ii) all messages transmitted by a station are in plain language related solely to:

(a) the experiments of the licencee; or

(b) the personal affairs of the licencee or the person to whom the message is transmitted.

(iii) the station is not used to:

(a) transmit news, advertisements, communications of a non-experimental character.

(b) messages for pecuniary reward.

(c) messages for or on behalf of a third party, except in times of local, national, or international disasters.

(iv) no message which is offensive, indecent or obscene is transmitted from the station of the licencee.

(v) the frequency is monitored in order to ensure the transmission will not cause interference to the station, before a call or test transmission is made.

(vi) The Licencee or any other authorised person who uses the Radio Equipment, shall transmit the call sign which has been assigned to the Licencee as follows:

(a) during initial calls (CQ) to establish contact with another Amateur.

(b) at least once every 15 minutes when the period of communication is longer than 15 minutes.

(c) whenever the frequency of transmission is changed, at the beginning of transmission on the new frequency.

(d) by the same type of transmission that is being used for the communication.

(e) on the same frequency that is being used for the communication.

(f) In calling another station, if using Morse Code/CW, the call-sign of that station shall be sent after which the signal "de" (for "from") shall be sent once and the call-sign of a calling station. When a station called does not reply to a call sent three times at intervals of two minutes, the calling shall cease and may not be resumed until after an interval of fifteen minutes.

(g) In answering a call in Morse Code/CW, the call-sign of the calling station shall be sent, the signal "de" once and the call-sign of the answering station.

(h) The licencee shall use the accepted practice of the transmitting messages and shall be conversant with the accepted international Q-codes.

8. **Station Call-Sign**

The station's call-sign may be altered at any time by the Ministry by notice in writing. It must be sent for identification purposes at the beginning and end of each period of transmission. The prefix for Barbados licenced stations is '8P' and shall always be included in the call-sign.

Where an amateur radio licence remains unpaid for a period of up to two years, the call sign may be rescinded. Notice of such will be published in the Official Gazette.

9. **Radiotelephony Operation**

When telephony is used, the letters of the call-sign and in cases where it is necessary to spell out words or figures, the international accepted Phonetic Alphabet and Figure Code as shown in Appendix *1* should be used. Words used in this manner shall not have any undesirable or improper interpretation.

10. **Station Log-Book**

An indelible record shall be kept in a log-book, serially numbered (not loose leaf) showing the following:

(a) (i) date and time of commencement and ending of every call made from the station.

(ii) call-signs of the stations from which messages addressed to the station are received or to which messages are sent.

(iii) time (local or GMT) of the commencement and termination of radio traffic.

(iv) test transmissions of the stations.

(v) frequency band(s) and class or classes of emission in each case.

(vi) no gaps shall be left between entries and all entries shall be made at the time of sending and receiving.

(vii) the record shall in all cases be signed at the time of recording by the licencee.

(b) Every such log-book shall be preserved by the licencee for a period of two (2) years so that at any time full particulars of sending periods in the preceding calendar users are available for examination.

(c) The log-book shall be available, for examination at all reasonable times by an inspector of the Ministry.

11. **Inspection of Station**

The licencee of an amateur station shall at any reasonable time permits an inspector of the Ministry to inspect and test the station equipment.

12. **Avoidance of Interference**

(a) The equipment comprised in the station shall be so designed, constructed, maintained and used that the operation of the station does not cause any harmful interference to other authorized radio services or stations.

(b) In the case of interference, the licencee shall take all possible steps to eliminate the source of such interference.

(c) At all times, every precaution shall be taken to avoid over-modulation and to keep the radiated energy within the narrowest possible frequency bands having regard for the class of emission in use. In particular, the radiation of harmonics and spurious emissions shall be suppressed to such a level that they shall minimize interference with authorized radio services or stations.

(d) To ensure that the above requirements are met, tests shall be made from time to time and details of those tests shall be recorded in the station log-book.

(e) Adjustment of an amateur station shall in general be made by using a dummy load.

13. **Licencee's Station Used by the Ministry**

(a) Except with the written permission of the Ministry no licencee shall call or transmit to any station other than a licenced amateur station.

(b) The Ministry may, in exceptional circumstances, require a licencee to transmit by means of his station any message that is not in contravention of the provisions of the Telecommunications Act, 2001-36 or any Regulations made thereunder and the licencee shall comply with such request.

14. **Mobile/Portable Station**

The Ministry may grant approval to the holder of an Amateur Radio Station Licence to establish a station as a mobile or portable station subjecting to such conditions as it shall deem fit which shall include the following:

(a) The mobile or portable station shall only operate in the frequency bands approved by the Ministry; marine operation is permitted.

(b) The mobile or portable station and the general station for which a licence has been issued shall not be operated simultaneously.

(c) When established as a mobile or portable station, the call-sign shall be the call-sign allotted to the general station followed by "M" or "P" and the transmitter output power of the portable station shall not exceed 100 watts (ERP).

(d) The licence to establish a mobile or portable station may be modified or revoked at any time by the Ministry without assigning any reason therefore.

(e) The station is said to be operating as a mobile or portable station when it is readily movable from place to place to be operated therefrom.

(f) If a radio amateur has been licence to operate a fixed amateur radio station, the mobile or portable station can be licenced as part of the existing fixed amateur radio station set up and the station fee for the mobile/portable station is waived. The station fee for the mobile or portable station is however payable if such station is the only station operated by the radio amateur.

15. **Station to Close Down**

The station shall be closed down at any time demanded by an inspector acting under the authority of the Minister.

16. **Period of Licence, Renewal, Revocation and Variation**

(a) The licence shall continue in force for one year from the date of issue, thereafter so long as the licencee pays to the Ministry in advance each year on or before the expiry of the current licence, the renewal fees prescribed in the Telecommunication Fees Regulations. The Ministry may at anytime vary all or any of the conditions upon which a licence is granted or impose additional conditions and a licencee shall, at his own expense, comply with the varied or additional conditions.

(b) The Ministry may refuse to renew a licence without assigning any reason therefor.

(c) The licence is not transferable except with the consent in writing of the Ministry.

17. **Return of Licence**

The licencee shall return the licence to the Ministry when it has been suspended or revoked.

18. **Power, Frequencies and Types of Emission**

*Holders of the Foundation Licence have the privileges as noted in Table A.*

**Table A**

| POWER | FREQ/ KHZ | METERS | TYPES OF EMISSION |
|---|---|---|---|
| 100 | 3500 - 4000 | 80 | All Modes except Morse unless an optional Morse test is passed |
| | | | |
| 100 | 7000 - 7300 | 40 | as above |
| | | | |
| 100 | 144000 - 148000 | 2 | as above |

**Licencees should refer to the International Amateur Radio Union's (IARU) Region 2 LF/MF/HF Band Plan in the Amateur Radio Handbook. The IARU has established the Band Plan to assist in the better organization and efficient use of the various International Telecommunications Union (ITU)**

*Holders of the Intermediate Licence have the privileges noted in Table B.*

**Table B**

| POWER | FREQ/ KHZ EMISSION | METERS | TYPES OF |
|---|---|---|---|
| 100 | 1800 - 2000 | 160 | All Modes except Morse unless a Morse test is passed |
| 100 | 3500 - 4000 | 80 | As Above |
| 50 | 5250 - 5450 | 60 | A3A (USB) |
| 100 | 7000 - 7300 | 40 | All Modes except Morse unless a Morse test is passed |
| 100 | 10100 - 10150 | 30 | digital only ; Morse if Morse test passed |
| 100 | 14000 - 14350 | 20 | All Modes except Morse unless a Morse test is passed |
| 100 | 18068 - 18168 | 17 | As above |
| 100 | 21000 - 21450 | 15 | As above |
| 100 | 24890 - 24990 | 12 | As above |
| 100 | 28000 - 29700 | 10 | As above |
| 100 | 50000 - 54000 | 6 | As Above |
| 100 | 144000 - 148000 | 2 | As above |

**Licencees should refer to the International Amateur Radio Union's (IARU) Region 2 LF/MF/HF Band Plan in the Amateur Radio Handbook. The IARU has established the Band Plan to assist in the better organization and efficient use of the various International Telecommunications Union (ITU)**

*Holders of the Advanced Licence have the privileges in Table C and Table D*

## Table C

| POWER | FREQ/ KHZ | METERS | TYPES OF EMISSION |
|---|---|---|---|
| 500 | 1800 - 2000 | 160 | All Modes |
| 500 | 3500 - 4000 | 80 | As Above |
| 50 | 5250 - 5450 | 60 | A3A (U SB) |
| 500 | 7000 - 7300 | 40 | All Modes |
| 200 | 10100 – 10150 | 30 | Morse and Digital; no voice |
| 500 | 14000 - 14350 | 20 | All Modes |
| 500 | 18068 - 18168 | 17 | All Modes |
| 500 | 21000 - 21450 | 15 | All modes |
| 500 | 24890 - 24990 | 12 | All modes |
| 500 | 28000 - 29700 | 10 | All modes |
| 500 | 50000 - 540000 | 6 | All modes |
| 500 | 144000 - 148000 | 2 | All modes |

**Licencees should refer to the International Amateur Radio Union's (IARU) Region 2 LF/MF/HF Band Plan in the Amateur Radio Handbook. The IARU has established the Band Plan to assist in the better organization and efficient use of the various International Telecommunications Union (ITU)**

## *Table D*

## *VHF FREQUENCIES IN MHZ:*

| | |
|---|---|
| 1.25 meters | 219 - 220<br>222 - 225 |
| 70 centimeters | 420 - 450 |
| 33 centimeters | 902 - 928 |
| 23 centimeters | 1240 - 1300 |
| 13 centimeters | 2300 - 2310<br>2390 - 2450 |
| 9 centimeters | 3300 - 3500 |
| 5 centimeters | 5650 - 5925 |
| 3 centimeters | 10000 - 10500 |
| 1.2 centimeters | 24000 - 24250 |
| 6 millimeters | 47000 - 47200 |
| 4 millimeters | 75500 - 81000 |
| 2.5 millimeters | 119980 - 120020 |
| 2 millimeters | 142000 - 149000 |
| 1 millimeter | 241000 - 250000 |

1. These bands allocated to stations in the Amateur Service on a secondary basis and are used on condition that they do not cause interference to other radio services.

2. These bands are shared by other services.

3. Only certain spot frequencies within these bands are allocated for use by radio amateurs and these spot frequencies can be obtained on written application from the Telecommunications Unit.

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4. Use of any frequency in these bands in Table D shall be only with the prior written consent of the Ministry and it shall indicate the power and conditions under which the station may transmit, taking into consideration the operational characteristics of the station.

## Appendix 1

## Phonetic Alphabet

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

## Appendix 2

## Q codes

| | |
|---|---|
| **QRG** | Your frequency is |
| **QRH** | Your Frequency varies |
| **QRI** | The tone of your transmission |
| **QRK** | The intelligibility is |
| **QRL** | I am busy |
| **QRM** | I'm being interfered with |
| **QRN** | I'm troubled with static |
| **QRO** | Increase TX power |
| **QRP** | Decrease TX power |
| **QRQ** | Send faster |
| **QRS** | Send more slowly |
| **QRT** | Stop sending |
| **QRU** | I've nothing for you |
| **QRV** | I am ready |
| **QRW** | Call ... on ... ? |
| **QRX** | I'll call again at ..hours |
| **QRZ** | You're being called by: |
| **QSA** | Your signal strength is: |
| **QSB** | Your signals are fading |
| **QSD** | Keying is defective |
| **QSG** | Send ... messages at a time? |
| **QSK** | I can hear you, Break in |
| **QSL** | I am acknowledging receipt |
| **QSM** | Repeat last message |
| **QSO** | I can communicate with |
| **QSP** | I will relay to: |
| **QSV** | Send a series of V's |
| **QSW** | Send on this frequency |
| **QSX** | Listen for ... on ... |
| **QSY** | Change frequency to .. |
| **QSY** | Change frequency |
| **QSZ** | Repeat each word/group |
| **QTA** | Cancel message number |
| **QTB** | Agree with word count |
| **QTC** | I have ... telegrams for you |
| **QTH** | My location is: |
| **QTR** | What is the correct time |
| **QTX** | Wait for further commas |
| **QUA** | Have you news of ... |

## Appendix 3

## FOUNDATION CLASS LICENCE SYLLABUS

This Syllabus is available on-line at:
http://www.telecoms.gov.bb/website/

A printed copy is available from:
The Amateur Radio Society of Barbados
email: 8p6arsb@gmail.com

1. **Regulations, Conditions, descriptions and definitions for the amateur radio service, operator and station licence responsibilities**

- Amateur Radio services; purpose of the amateur service, amateur-satellite service, operator/primary station licence grant, local regulations and conditions.

- Authorized frequencies; frequency allocations, ITU regions and IARU Region 2 Band Plan, emission type, restriction sub-bands, spectrum sharing, transmissions near band edges

- Operator classes and station call signs; operator classes, sequential, special event, and vanity call sign systems, international communications, reciprocal operation, station licence licencee, licence term, renewal, grace period

- Authorized and prohibited transmissions

- Control operator and control types; control operations for repeaters and auxiliary stations, third party communications, club stations, station security, Telecommunications Unit inspection

## 2. Operating Practices and Procedures

- Station operation; choosing an operating frequency, calling another station, test transmissions, use of minimum power, frequency use, band plans, station log, Q-code, phonetic alphabet

- HF/VHF operating practices; SSB phone, FM repeater, simplex, frequency offsets, splits and shifts, CTCSS, DTMF, tone squelch, carrier squelch, phonetics

- Public service; emergency and non-emergency operations, message traffic handling

## 3. Radio wave characteristics; radio and electromagnetic properties, propagation modes

- Radio wave characteristics; how a radio signal travels; distinctions of HF, VHF and UHF; fading, multipath; wavelength vs. penetration; antenna orientation

- Radio and electromagnetic wave properties; the electromagnetic spectrum, wavelength vs. frequency, velocity of electromagnetic waves

- Propagation modes; line of sight, sporadic E, meteor, aurora scatter, tropospheric ducting, F layer skip, radio horizon

## 4. Amateur radio practices and station setup

- Station setup; microphone, speaker, headphones, filters, power source, connecting a computer, RF grounding
- Operating controls; tuning, use of filters, squelch, AGC, repeater offset, memory channels

**5. Electrical principles, math for electronics, electronic principles, Ohm's Law**

– Electrical principles; current and voltage, conductors and insulators, alternating and direct current, Ohms Law

– Math for electronics; decibels, electronic units and the metric system

– Electronic principles; capacitance, inductance, current flow in circuits, alternating current, definition of RF, power calculations

– Ohm's Law

**6. Electrical components, semiconductors, circuit diagrams, component functions**

– Electrical components; fixed and variable resistors, capacitors, and inductors; fuses, switches, batteries

– Semiconductors; basic principles of diodes and transistors

– Circuit diagrams; schematic symbols

– Component functions

**7. Station equipment, common transmitter and receiver problems, antenna measurements and troubleshooting, basic repair and testing**

– Station radios; receivers, transmitters, transceivers

– Common transmitter and receiver problems; symptoms of overload and overdrive, distortion, interference, over and under modulation, RF feedback, off frequency signals; fading and noise; problems with digital communication interfaces, spurious emissions

– Antenna measurements and troubleshooting; measuring SWR, dummy loads, feedline failure modes

**8. Basic repair and testing; soldering, use of a voltmeter, ammeter, and ohmmeter**

**9. Modulation modes, amateur satellite operation, operating activities, non-voice communications**

- Modulation modes; bandwidth of various signals

- Amateur satellite operation; Doppler shift, basic orbits, operating protocols
- Operating activities; radio direction finding, radio control, contests, special event stations, basic linking over the internet

- Non-voice communications; image data (SSTV), digital modes, Morse Code/CW, packet, PSK31

**10. Antennas, feedlines**

- Antennas; vertical and horizontal, concept of gain, common portable and mobile antennas, relationships between antenna length and frequency

- Feedlines; types, losses vs. frequency, SWR concepts, matching, weather protection, connectors

**11. AC power circuits, antenna installation, RF hazards**

- RF safety principles, rules and guidelines; routine station evaluation

- Antenna installation; tower safety, overhead power lines

- RF hazards; radiation exposure, proximity to antennas, recognized safe power levels, exposure to others

## Appendix 4

## INTERMEDIATE CLASS SYLLABUS

### 1. REGULATIONS

- Intermediate class control operator frequency privileges; primary and secondary allocations

- Antenna structure limitations; good engineering and good amateur practice; beacon operation; restricted operation; retransmitting radio signals

- Transmitter power regulations; HF data emission standards

- Control categories; repeater regulations; harmful interference; third party rules; ITU regions and IARU Region 2 Band Plan

### 2. OPERATING PROCEDURES

- Station operation; choosing an operating frequency, calling another station, test transmissions, use of minimum power, frequency use, band plans, station log, Q-code, phonetic alphabet

- Phone operating procedures; USB/LSB utilization conventions; procedural signals; breaking into a QSO in process; VOX operation

- Operating courtesy; band plans

- Emergencies, including drills and emergency communications

- Amateur auxiliary; minimizing Interference; VHF/HF operations

- Digital operating; procedures, procedural signals and common abbreviations

- Morse Code/CW operating procedures and procedural signals, common abbreviations; full break in

## 3. RADIO WAVE PROPAGATION

– Sunspots and solar radiation; ionospheric disturbances; propagation forecasting and indices

– Maximum Usable Frequency; Lowest Usable Frequency; propagation “hops”

– Ionospheric layers; critical angle and frequency; HF scatter; Near Vertical Incidence Sky waves

– VHF/UHF propagation

## 4. AMATEUR RADIO PRACTICES

– Two-tone Test; amplifier tuning and neutralization; DSP

– Test and monitoring equipment

– Interference with consumer electronics; grounding

– Speech processors; S meters; common connectors

– HF/VHF mobile radio installations; emergency and battery powered operation

## 5. ELECTRICAL PRINCIPLES

– Resistance; reactance; inductance; capacitance; impedance; impedance matching

– The Decibel; current and voltage dividers; electrical power calculations; sine wave root-mean-square (RMS) values; PEP calculations

– Resistors, capacitors, and inductors in series and parallel; transformers

## 6. CIRCUIT COMPONENTS

- Resistors; capacitors; inductors

- Rectifiers; solid state diodes and transistors; solar cells; vacuum tubes; batteries

- Analog and digital integrated circuits (IC's); microprocessors; memory; I/O devices; display devices

## 7. PRACTICAL CIRCUITS

- Power supplies; transmitters and receivers; filters; schematic symbols
- Digital circuits (gates, flip-flops, shift registers); amplifiers and oscillators

## 8. SIGNALS AND EMISSIONS

- Carriers and modulation: AM; FM; single and double sideband; modulation envelope; deviation; overmodulation

- Frequency mixing; multiplication; HF data communication; bandwidths of various modes

## 9. ANTENNAS

- Antenna feedlines: characteristic impedance, attenuation; SWR calculation, measurement and effect; matching networks

- Basic antennas

- Directional antennas

- Specialized antennas

## Appendix 5

### *Advanced Licence Class Syllabus*

### 1. REGULATIONS

- Operating Standards: frequency privileges for Advanced Class amateurs; emission standards; automatic message forwarding; frequency sharing; stations aboard ships or aircraft

- Station restrictions and special operations: restrictions on station location; general operating restrictions, spurious emissions, control operator reimbursement; antenna structure restrictions;

- Station control: definitions and restrictions pertaining to local, automatic and remote control operation; control operator responsibilities for remote and automatically controlled stations

- Amateur Satellite service: definitions and purpose; licence requirements for space stations; available frequencies and bands; telecommand and telemetry operations; restrictions, and special provisions; notification requirements

- Volunteer examiner program: definitions, qualifications, preparation and administration of exams; accreditation; question pools; documentation requirements

- Miscellaneous rules: external RF power amplifiers; Line A; national quiet zone; business communications; compensated communications; spread spectrum; auxiliary stations; reciprocal operating privileges;

  IARP and CEPT licences; third party communications with foreign countries; special temporary authority

### 2. OPERATING PRACTICES AND PROCEDURES

- Station operation; choosing an operating frequency, calling another station, test transmissions, use of minimum power, frequency use, band plans, station log, Q-code, phonetic alphabet

- Amateur radio in space: amateur satellites; orbital mechanics; frequencies and modes; satellite hardware; satellite operations

- Television practices: fast scan television standards and techniques; slow scan television standards and techniques

- Operating methods, part 1: contest and DX operating; spread-spectrum transmissions; automatic HF forwarding; selecting and operating frequency

- Operating methods, part 2: VHF and UHF digital modes; packet clusters; Automatic Position Reporting System (APRS)

- Operating methods, part 3: operating HF digital modes; error correction

## 3. RADIO WAVE PROPAGATION

- Propagation and technique, part 1: Earth-Moon-Earth communications; meteor scatter

- Propagation and technique, part 2: transequatorial; long path; gray line; multi-path propagation

- Propagation and technique, part 3: Auroral propagation; selective fading; radio-path horizon; take-off angle over flat or sloping terrain; earth effects on propagation; less common propagation modes

## 4. AMATEUR RADIO TECHNOLOGY AND MEASUREMENTS

- Test equipment: analog and digital instruments; spectrum and network analyzers, antenna analyzers; oscilloscopes; testing transistors; RF measurements

- Measurement technique and limitations: instrument accuracy and performance limitations; probes; techniques to minimize errors; measurement of “Q”; instrument calibration

- Receiver performance characteristics, part 1: phase noise, capture effect, noise floor, image rejection, MDS, signal-to-noise-ratio; selectivity

- Receiver performance characteristics, part 2: blocking dynamic range, intermodulation and cross modulation interference; 3rd order intercept; desensitization; preselection

- Noise suppression: system noise; electrical appliance noise; line noise; locating noise sources; DSP noise reduction; noise blankers

## 5. ELECTRICAL PRINCIPLES

- Resonance and Q: characteristics of resonant circuits: series and parallel resonance; Q; half-power bandwidth; phase relationships in reactive circuits

- Time constants and phase relationships: R/L/C constants: definition; time constants in RL and RC circuits; phase angles between voltage and current; phase angles of series and parallel circuits

- Impedance plots and coordinate systems: plotting impedances in polar coordinates; rectangular coordinates

- AC and RF energy in real circuits: skin effect; electrostatic and electromagnetic fields; reactive power; power factor; coordinate systems

## 6. CIRCUIT COMPONENTS

- Semiconductor materials and devices: semiconductor materials (germanium, silicon, P-type, N-type); transistor types; NPN, PNP, junction, power; field-effect transistors; enhancement mode; depletion mode; MOS; CMOS; N-channel; P-channel

- Semiconductor diodes

- Integrated circuits: TTL digital integrated circuits; CMOS digital integrated circuits; gates

- Optical devices and toroids: vidicon and cathode-ray tube devices; charge-coupled devices (CCDs); liquid crystal displays (LCDs); toroids: permeability, core material, selecting winding

- Piezoelectric crystals and MMICS: quartz crystals (as used in oscillators and filters); monolithic amplifiers (MMICs)

- Optical components and power systems: photoconductive principles and effects, photovoltaic systems, optical couplers, optical sensors and optoisolators

## 7. PRACTICAL CIRCUITS

- Digital circuits: digital circuit principles and logic circuits: classes of logic elements; positive and negative logic; frequency dividers; truth tables

- Amplifiers: Class of operation, vacuum tube and solid state circuits; distortion and intermodulation; spurious and parasitic suppression, microwave amplifiers

- Filters and matching networks: filters and impedance matching networks: types of networks; types of filters; filter applications; filter characteristics; impedance matching; DSP filtering

- Power supplies and voltage regulators

- Modulation and demodulation: reactance, phase and balance modulators; detectors; mixer stages; DSP modulation and demodulation; software defined radio systems

- Frequency markers and counters: frequency divider circuits; frequency marker generators; frequency counters

- Active filters and op-amps: active audio filters; characteristics; basic circuit design; operational amplifiers

- Oscillators and signal sources: types of oscillators; synthesizers and phase-locked loops; direct digital synthesizers

## 8. SIGNAL AND EMISSIONS

- AC waveforms: sine, square, sawtooth and irregular waveforms; AC measurements; average and PEP of RF signals; pulse and digital signal waveforms

- Modulation and demodulation: modulation methods; modulation index and deviation ratio; pulse modulation; frequency and time division multiplexing

- Digital signals: digital communications modes; CW; information rate vs. bandwidth; spread-spectrum communications; modulations; modulation methods

- Waves, measurements, and RF grounding: peak-to-peak values, polarization; RF grounding

## 9. ANTENNAS AND TRANSMISSION LINES

- Isotropic and gain antennas: definition; used as a standard for comparison; radiation pattern; basic antenna parameters: radiation resistance and reactance, gain, beamwidth, efficiency

- Antenna patterns: E and H plane patterns; gain as a function of pattern; antenna design (computer modeling of antennas); Yagi antennas

- Wired and phased vertical antennas: beverage antennas; terminated and resonant rhombic antennas; elevation above real ground; ground effects as related to polarization; take-off angles

- Directional antennas: gain; satellite antennas; antenna beamwidth; losses; SWR bandwidth; antenna efficiency; shortened and mobile antennas; grounding

- Matching: matching antennas to feed lines; power dividers

- Transmission lines: characteristics of open and shorted feed lines: 1/8 wavelength; ¼ wavelength; ½ wavelength; feed lines: coax versus open-wire; velocity factor;

- Electrical length; transformation characteristics of line terminated in impedance not equal to characteristic impedance

- The Smith chart

## 10. Safety

- Safety: amateur radio safety practices; RF radiation hazards; hazardous material

These syllabuses are available on-line at:
http://www.telecoms.gov.bb/website/

Printed copies are available from:
The Amateur Radio Society of Barbados
email: 8p6arsb@gmail.com