MAURITIUS AMATEUR RADIO SOCIETY

Class B Entry Level Amateur Radio Examinations

For Examinations held after September 2020

December 2020

Contents

Section 1

Syllabus

Introduction

The Class B Radio communications Examination is part of a two tier examinations recognised by ICTA to give access to the amateur radio bands. All prospective radio amateurs must demonstrate a suitable level of competence and proficiency as a pre-requisite to holding a licence.

The Class B Licence is the entry level to amateur radio. It is intended to provide an exciting introduction to the hobby whilst requiring an acceptable minimum level of skill and experience.

This syllabus sets out the requirements for the first tier in the 2 tier structure consisting of the class B and the class A examinations.

Key Features

- Part of a progressive system of learning designed to promote an understanding of radio communications science, technology and practice sufficient to allow the licensed operator to work safely on the amateur radio bands.
- Clear presentation of content for easy reference.
- The examination suite as a whole provides a backbone of theoretical knowledge whilst at the same time requiring 'On-air' experience and practical skills.
- A Syllabus Guide is available to accompany the syllabus amplifying syllabus points and assessment procedures.
- A student's workbook is available covering the syllabus and is suitable for self study if desired.
- Can be used within schools to enrich the Science and Technology curriculum.

The Assessment

Two methods of assessment are used. A practical assessment detailed in sections 8e and 8f of the syllabus requires demonstration of setting up a radio transmitter/receiver and correct on-air operating. These items must be assessed by a registered assessor, who may also be the tutor. This is followed by an examination of 25 multiple-choice questions, each with 4 possible responses, which covers the remainder of the syllabus. The examination lasts 45 minutes.

Prior Learning and Progression

As this is the entry point, no prior subject knowledge is required. There are no set age limits.

The candidate may progress at his or her own pace, but must pass the class B examinations first before attempting the class A examinations, the practical assessment must be completed before taking the class B examination. The Class A level examination does not include a practical assessment.

Candidates with disabilities

Arrangements can be made for candidates with disabilities to demonstrate skills and knowledge by whatever means is judged appropriate.

Applications for special arrangements should be made well in advance of the examination to the Mauritius Amateur Radio Society (MARS) and will normally require a medical certificate. Appeals after the examination citing disabilities or learning difficulties not previously declared cannot be considered.

The syllabus

The key points of study are shown under *Assessment Objectives*. The words “recall” and “understand” are used to denote differing levels of comprehension.

Recall indicates the need to remember a fact and apply it fairly directly to a question or situation. A thorough understanding of why the fact is so and the full range of circumstances in which it is applicable is not required, but questions will expect a basic understanding.

An example is objective 3b.1 which requires knowledge of the formula $P=V\times I$, what the letters stand for and the ability to perform a calculation given any two of the factors. The question will not normally require the use of a calculator since no useful purpose is served by making the question arithmetically difficult. Alternatively, the question may ask the effect of, for example, of doubling or halving one of the factors. Another example is objective 1a.1. The candidate needs to know that amateur radio is non-commercial, and not used to discuss business or negotiate the sale of amateur equipment in a commercial context.

Understand indicates the need for a more detailed knowledge of the subject, understanding why the point is correct and the range of circumstances in which it is relevant and applicable.

Typically, this will be where the candidates will find themselves having to make judgements or apply a practice to a wider range of circumstances. 4b.6 is an example concerning over modulation where the candidate needs to appreciate the cause and effect and its implications so that there is an incentive to avoid the problems of over modulation. Also, in 9c.1, for example, regarding trailing wires, the student may meet a wide variety of situations and needs to be able to apply the basic rule to whatever circumstances occur. An ability to analyse the safety of the situation is needed which requires an understanding of how problems may develop and what different risks are involved.

Language

The language of assessment will be English.

Updates

Updates to this syllabus will be made from time to time and the latest version can be obtained from the RSGB website. Where the update involves a significant change to the syllabus content, the date from which the syllabus is valid for examinations will be amended to show the new period of validity of the syllabus. A minimum of three months notice will be given.

Changes to the licence schedule and band plans should not affect the examination because those document are provided for reference.

Syllabus		*Assessment Objectives*	
	1. Amateur radio		
1a	Nature of amateur radio	1a.1	Recall that the amateur licence is for self-training in radio communications and is of a non-commercial nature.
	2. Licensing Conditions		
2a	Types of Amateur Licence	2a.1	Recall the types of Amateur Licence. Recall that more advanced classes of amateur licence exist and that they allow greater facilities and the ability to design /modify transmitting equipment. Recall that many other countries do not currently accept the class B Licence.
2b	Format of Amateur call signs	2b.1	Recall the format of the current class B and class A call signs. .
2c	Licence terms and conditions. Assessable items as shown in *assessment objectives.*	2c.1	Recall the requirements for station identification.
		2c.2	Recall the requirement to send messages only to other amateurs.
		2c.3	Recall that secret codes are not permitted.
		2c.4	Recall that broadcasting is not permitted.

Syllabus		*Assessment Objectives*	
		2c.5	Recall that only the licensee, or another licensed amateur operating under his or her supervision, may use the Radio Equipment. Recall that in certain circumstances the licensee may allow the equipment to be used by a member of a User Service. *Note that the nature of the circumstances and the identity of the user services are not examinable.*
		2c.6	Recall the requirement to notify ICTA of change of address.
		2c.7	Recall that a person authorised by ICTA has the right to inspect, require the modification, close down or restrict the operation of the Radio Equipment.
		2c.8 (VHF) 2c.9 (HF)	Understand and apply the Schedule to the licence. Identify allowable frequencies and power limits.
3. Technical Basics			
3a	Units of measurement and multiple/sub-multiple prefixes.	3a.1	Identify the units of, and abbreviations for Potential Difference (Voltage), Current, Power and Resistance. *Note: Prefixes milli, kilo and Mega may be used.*
3b	Simple circuit theory	3b.1	Understand that, in a metallic conductor, an electric current is the flow of electrons. Recall that a conductor allows the electrons to flow easily and an insulator does not. Understand that metals such as copper and brass are good conductors. Plastics, wood, rubber, glass and ceramics are regarded as insulators. Understand that water is a conductor, and that wet insulators can conduct electricity through the surface water.

Syllabus		*Assessment Objectives*	
		3b.2	Recall the relationship between Potential difference (Voltage), Current and Power. ($P=V\times I$, $I=P/V$, $V=P/I$) Calculate the unknown quantity given the numerical value of the other two.
		3b.3	Recall that resistance is the opposition to current flow. Recall the relationship between Potential Difference (Voltage), Current and Resistance. ($V=I\times R$, $I=V/R$, $R=V/I$) Calculate the unknown quantity given the numerical value of the other two.
		3b.4	Recall that a battery provides Potential Difference (Voltage) at its terminals and that a circuit is needed to allow current to flow.
		3b.5	Recall that the polarity of a battery is not relevant if a filament bulb is used but that electronic circuits can be damaged by the wrong polarity.
		3b.6	Recall what is meant by the abbreviations DC and AC.
		3b.7	Identify the circuit symbols shown in Table 1 (at back).
3c	Frequencies used in power, audio and radio systems.	3c.1	Recall the unit of frequency and understand the meaning of the abbreviations RF and AF. Identify the graphic representation of a sine wave and recall that sine waves are produced by oscillators Recall the frequency of the mains supply - 50Hz Recall the range of frequencies for normal hearing – 100Hz- 15kHz Recall the range of frequencies for audio communication - 300Hz-3kHz. Recall the frequency bands for HF, VHF, and UHF radio signals.
		3c.2	Understand that frequency bands are allocated for particular use, e.g. broadcasting, aeronautical, maritime and amateur.

Syllabus		*Assessment Objectives*	
		3c.3	Understand the relationship between frequency (f) and wavelength (λ). Use a graph to convert from one to the other. *Note: calculations are not required.*
	4. Transmitters and Receivers		
4a	Simple block or “concept” diagrams of transmitters see Table 2.	4a.1	Identify the items in a simple transmitter block diagram and recall their order of interconnection: Microphone, audio (microphone) amplifier stage, frequency generation stage, modulator stage, RF power amplifier stage, feeder and antenna.
4b	Technical requirements of radio transmitters	4b.1	Recall that the frequency generation stage(s) (e.g. oscillator(s)) in a transmitter defines the frequency on which the transmitter operates. Recall that incorrect setting of these stages can result in operation outside the amateur band and interference to other users.
		4b.2	Recall that the audio (or data) signal is modulated on to the radio frequency ’carrier’ in the modulation stage of the transmitter. Recall that modulation is by varying the amplitude or frequency of the “carrier”, resulting in AM or FM modulation modes. Recall that speech can be carried by AM/SSB or FM and that data may be transmitted by means of suitable audio tones generated in a radio modem or TNC (terminal node controller).
		4b.3	Identify drawings of an RF carrier and amplitude modulated, frequency modulated and CW radio signals. Understand the terms carrier, audio waveform and modulated waveform.
		4b.4	Recall that the power amplification of the radio signal is carried out in the final stage of the transmitter. (RF power amplifier).
		4b.5	Recall that the RF power amplifier output must be connected to a correctly matched antenna to work properly and that use of the wrong antenna can result in damage to the transmitter.

	Syllabus		*Assessment Objectives*
		4b.6	Understand that excessive amplitude modulation causes distorted output and interference to adjacent channels. Understand that excessive frequency deviation will cause interference to adjacent channels. Recall the need to ensure that the microphone gain control (where fitted) is correctly adjusted.
4c	Simple block or “concept” diagrams of a receiver, see Table 2.	4c.1	Identify the items in a simple receiver block diagram and recall their order of interconnection: antenna, feeder, radio tuning and RF amplification, detection/demodulation, audio amplification and loudspeaker or headphones.
4d	Technical requirements of radio receivers	4d.1	Recall that tuning of receiver is carried out in first stages of the receiver.
		4d.2	Recall that detection/demodulation (recovery of the original modulating signal) is carried out in the second stage of the block diagram and that audio amplification is achieved in the third stage of a receiver.
	5. Feeder and Antenna		
5a	Feeder requirements	5a.1	Recall the correct cable to use for RF signals and that coaxial cable is most widely used because of its screening properties.
		5a.2	Recall that the plugs and sockets for RF should be of the correct type and that the braid of coaxial cable must be correctly connected to minimise RF signals getting into or out of the cable. Identify BNC and PL259 plugs as shown in Table 2.
5b	Types of antenna	5b.1	Recall that the purpose of an antenna is to convert electrical signals into radio waves (and vice-versa) and that these are polarised according to the orientation of the antenna, e.g. a horizontally oriented antenna will radiate horizontally polarised waves.

Syllabus		Assessment Objectives	
		5b.2	Identify the half-wave dipole, λ/4 ground plane, Yagi, end-fed wire and 5/8λ antennas. Understand that the sizes of HF and VHF antennas are different because they are related to wavelength, though they operate on the same basic principles. Understand that the λ/2 dipole has a physical length approximately equal to a half wavelength of the correct signal.
5c	Antenna basics	5c.1	Understand that half-wave dipoles (mounted vertically), ground planes and 5/8λ antennas are omni-directional.
		5c.2	Understand that a Yagi antenna is directional and has a gain because of its focussing ability.
		5c.3	Recall that ERP is the product of the power to the antenna and its gain.
		5c.4	Recall that the antenna system must be suitable for the frequency of the transmitted signal. Recall that if an antenna is not correctly designed for the frequency it will not match the transmitter and will not work effectively.
		5c.5	Recall that at HF, where an antenna has not been designed for the particular frequency, an ATU (antenna tuning unit) improves the ability of the antenna to accept power from the transmitter. Recall that, when an antenna is not well matched to a transmitter, a matching unit, commonly known as an ATU (antenna tuning unit), is used to ensure that the transmitter can supply energy to the antenna without damage to the transmitter.
5d	Balanced antennas	5d.1	Understand the difference between balanced and unbalanced antennas and that a balun should be used when feeding an HF dipole with coaxial cable (which is unbalanced).
5e	Standing Wave Ratios (SWR)	5e.1	Recall that an SWR meter shows whether an antenna presents the correct match to the transmitter and is reflecting minimum power back to the transmitter.

Syllabus		*Assessment Objectives*	
		5e.2	Recall that a high SWR (measured at the transmitter) is an indication of a fault in the antenna or feeder (and not the transmitter). (Relate this to item 4b.5.)
5f	Dummy loads	5f.1	Recall that a “dummy load” is a screened resistor connected instead of an antenna to allow the transmitter to be operated without radiating a signal.
	6. Propagation		
6a	Radio propagation basics	6a.1	Recall that radio waves travel in straight lines, unless diffracted or reflected.
		6a.2	Recall that radio waves get weaker as they spread out.
		6a.3	Recall that at VHF and UHF hills cause “shadows” and that waves get weaker in penetrating buildings but glass windows are more transparent to radio waves.
		6a.4	Recall that the range achieved at VHF/UHF is dependent on antenna height and a clear path and transmitter power. Understand that higher antennas are preferable to higher power as they improve both transmit and receive performance. Recall that outdoor antennas will perform better than indoor antennas.
		6a.5	Recall that, at VHF/UHF, range decreases as frequency increases and that in general, VHF/UHF waves have a range not much beyond ’line of sight’.
6b	Ionosphere basics	6b.1	Recall that the ionosphere comprises layers of conductive gases at heights between 70 and 400km above the earth.

Syllabus		*Assessment Objectives*	
		6b.2	Recall that on HF most communication relies on the waves being reflected by the ionosphere. Recall that HF can provide world-wide propagation depending on how well the ionosphere bends the waves back to the earth. Recall that this varies with frequency, time of day and season.
	7. EMC		
7a	Basics of electromagnetic compatibility	7a.1	Recall that electromagnetic compatibility (EMC) is the avoidance of interference between various pieces of electronic equipment.
		7a.2	Recall that radio transmitters can cause interference to nearby electronic and radio equipment.
		7a.3	Recall that radio receivers can also suffer from interference from local sources.
		7a.4	Recall that interference occurs through local radio transmissions being conveyed to the affected equipment through pick up in house wiring, TV antenna down-leads, telephone wiring etc., and (particularly at VHF/UHF) by direct pick-up in the internal circuits of the affected equipment.
7b	Station design for EMC.	7b.1	Recall that EMC problems can be minimised by siting antennas as far away from houses as possible, as high as possible, and using balanced antennas at HF. Recall that, at HF, (horizontal) dipoles are less likely to be a problem and that end-fed wires present significant EMC problems. Recall that information on the avoidance of interference by the correct choice and siting of antennas and suitable operating procedures is readily available from several sources.

Syllabus		Assessment Objectives	
		7b.2	Recall that the more power a station runs, the more likely it is to cause interference. Recall that some types of transmission are more likely to cause interference to TV, radio and telephones than others. Recall that SSB is the one of the poorest in this respect. FM, CW (Morse) and the some of the HF data modes (such as PSK31) are much better.
7c	Immunity of radio receiving and other devices and filtering techniques.	7c.1	Recall that the ability of any piece of electronic or radio equipment to function correctly in the presence of strong RF signals is known as "immunity". Recall that the immunity of most types of equipment can be increased by fitting suitable external chokes and filters in mains or TV antenna leads. Recall that the filters should be fitted as close to the affected device as possible.
		7c.2	Recall that anything fitted to the mains wiring must be properly made for the purpose. Understand that home-made filters (other than ferrite rings) are potentially dangerous. Recall that information about the purchasing, making and fitting of chokes and filters is readily available from several sources.
		7c.3	Recall that the function of the RF earth connection in an HF amateur station is to provide a path to ground to minimise RF currents entering the mains earth system and causing interference to other electronic equipment.
7d	Social issues of Interference.	7d.1	Recall that EMC problems have the potential for causing neighbour disputes. Understand the need for diplomacy, the sources of advice available.

Syllabus		*Assessment Objectives*	
	8. Operating Practices and Procedures.		
8a	Operating practices and procedures	8a.1	Understand why one should listen before calling and then ask if the frequency is in use.
		8a.2	Recall how to make a CQ call.
		8a.3	Understand the need to move off the calling channel (when on VHF/UHF) once contact is established.
		8a.4	Recall the phonetic alphabet.
		8a.5	Recognise the advisability and common practice of keeping a log and the items recorded. *This item 8a.5 will not be examined.*
8b	Operating through a repeater.	8b.1	Recall that repeaters are mainly intended to extend the range of mobile stations. Recall how to use a repeater and understand the need for an Access Tone or CTCSS and frequency offset.
8c	Band plans	8c.1	Recall why band-plans are used. Identify items on a published band-plan (e.g. calling frequencies and recommended modes). *See Note 5.*
8d	Connecting microphones and other audio sources to the transmitter.	8d.1	Recall that connecting anything other than the supplied microphone (e.g. packet radio TNCs) to the transmitter requires correct operation of the PTT line and correct audio signal levels.
8e	Competence in making radio contacts. *This part of the syllabus is carried out as a practical assessment by registered assessors and may be part of a training course.*	8e.1	Demonstrate, using a VHF/UHF transmitter/receiver; correct tuning in to an amateur FM voice signal and a data signal such as packet. Read the signal strength meter (where fitted).

Syllabus	*Assessment Objectives*
	8e.2 Demonstrate correct operation of a VHF transmitter/receiver in simplex mode. *Note: Controls used shall include frequency, squelch and, audio gain (volume).* Recall the meaning of signal reports exchanged during a contact. Make a simplex radio contact and exchange signal reports.
	8e.3 Demonstrate, using an HF transmitter/receiver, correct tuning in to an amateur SSB voice signal and a Morse signal. Read the signal strength meter.
	8e.4 Demonstrate correct operation of an HF transmitter/receiver in an SSB contact. *Note: Controls used shall include frequency, the RIT (clarifier), audio gain (volume), RF gain, microphone gain and antenna tuner (ATU)*. Make an HF SSB voice contact and exchange signal reports.
	8e.5 Demonstrate a CQ call on VHF/UHF, making a contact and initiating a change of frequency (QSY) off the calling channel.
8f Connecting a transmitter/receiver. *This part of the syllabus is carried out as a practical assessment by registered assessors and may be part of a training course.* *If the candidate has any disability that reasonably prevents the carrying out of these procedures, he or she may talk another person through the task or describe it to a competent assessor.*	8f.1 Demonstrate connecting a transmitter/receiver to a power supply, antenna and feeder.
	8f.2 Demonstrate, using a λ/2 dipole antenna with adjustable elements, that the SWR varies as the length of the elements are varied. Set up the dipole for minimum SWR. *Note: The elements are not to be adjusted whilst transmitting. Correct procedure for a radiating test shall be demonstrated.*

9. Safety

Syllabus		*Assessment Objectives*	
9a	Sources of danger: mains, power supplies and high current batteries.	9a.1	Recall that high voltages carry a risk of electrocution and high currents carry a risk of overheating and fire.
		9a.2	Recall why mains powered equipment should have a safety earth. Recall that special care is needed with earthing arrangements if your house has PME. Recall that details of PME earthing can be obtained from the local electricity supply company and are covered in a separate leaflet.
		9a.3	Recall that correct fuses must be fitted to all electrical equipment and that this is in the live wire of mains powered equipment and according to the manufacturers' instructions in low voltage equipment.
		9a.4	Recall only to work inside equipment that is disconnected from the mains.
		9a.5	Recall the correct way to wire a 3-pin mains plug.
		9a.6	Understand the need for a clearly marked switch to turn off all station equipment in case of emergency.
9b	Actions to be taken and avoided in the event of an accident.	9b.1	Recall that, in the event of an accident involving electricity, the first action is to switch off the power. Recall that the casualty must not be touched unless the power has been switched off.
9c	Station layout and tidiness	9c.1	Understand the reasons for not having wires trailing across the floor, trip hazards and the risk of frayed insulation.
		9c.2	Recall that elevated wires and antennas must be suitably located and secured.
		9.c3	Recall that antennas and feeders should not be sited close to overhead power cables.

Syllabus		*Assessment Objectives*	
		9c.4	Recall that antenna erection is potentially hazardous and that it is advisable to have someone to help you. Understand the need for at least one adult to be present.
		9c.5	Recall that antenna elements should not be touched whilst transmitting and should be mounted to avoid accidental contact. *Note: this does not apply to low powered devices such as hand-held equipment.*
		9c.6	Recall that particularly high antennas may need special protection against lightning.
9d	Safe use of headphones	9d.1	Recall that excessive volume when wearing headphones can cause damage to hearing.

10. Morse Code

10a Send and Receive Morse Code

Note:
Morse is no longer required for any type of licence

Added

Section 1 – Licensing conditions and station identification
1A Nature of amateur radio, types of licence and callsigns.

1A3 Recall the Foundation Licence does not permit the on-air use of own design and modification of transmitting apparatus and that these privileges are available to Intermediate and Full licensees.

Section 2 – Technical aspects
2F Digital signals

2F1 Recall that analogue signals are constantly changing in amplitude, frequency or both.
Recall that digital signals are a stream of finite values at a specific sampling interval.
Recall that digital signals can be processed by a computing device with suitable software.

2F2 Recall that an Analogue to Digital Convertor (ADC) is a device used to sample an analogue signal and produce a digital representation of it.
Recall the meaning of the term ADC.
Recall that a computing device is required to process digital signals.
Recall that a Digital to Analogue Convertor (DAC) is a device used to represent a digital signal in analogue format.
Recall the meaning of the term DAC.

Section 3 – Transmitters and receivers
A Transmitter concepts

3A1 Recall that the function of a radio transmitter is to send information from one place to another using electromagnetic radiation/wireless technology.
Recall that the process of adding information to a radio frequency carrier is known as modulation.

3H Receiver concepts

3H1 Recall that the function of a radio receiver is to recover information sent from one place to another using electromagnetic radiation/wireless technology.
Recall that the process of recovering information from a modulated radio frequency signal is known as demodulation.

3M SDR Transmitters & receivers

3M1 Recall that the SDR receiver takes in all electrical signals from the antenna and digitises this input for processing in software.
Recall that a mathematical operation enables all the signals to be sifted into separate frequency components.
Recall that the required signal is selected using a filter defined in software. Recall that demodulation is carried out in software.

Recall that Software Defined Radio (SDR) receivers convert incoming speech signals to digital format and then perform filtering and modulation on an RF signal using software and that SDR transmitters generate modulated radio signals using software.

Section 6 – Electro Magnetic Compatibility (EMC)
6F Station design and antenna placement/mobile installations

6F2 Recall that any tests following mobile radio equipment installation should be done static with all vehicle electronic systems operating before any on-road tests are carried out.

Section 7 – Operating practices and procedures
7F Digital interfaces

7F1 Recall that there are digital voice (DV) and digital data (DD) modes available and that different systems may not be compatible.
Recall that appropriate radio equipment is needed for each of these digital systems. Recall that DV radios may embed the callsign and this will need to be considered if using borrowed equipment.

7F2 Users of Digital Voice (DV) should check that the channel is not in use by other modes.
Users of FM should check that the channel is not in use by other modes. Recall that such checks are not 100% reliable.

Section 8 – Safety
8A Electricity

8A8 Recall that some batteries can supply very high currents which can be hazardous if subjected to short circuit.
Recall that battery charging must be in accordance with manufacturer instructions and that lithium batteries in particular can cause fire and explosion if not properly treated.
Recall that different battery technologies require different charging techniques and must use the correct type of charger.

Section 10 – Practical assessments
10B Construction

10B2 Connect a battery, resistor and LED to show the LED lights when connected with the correct polarity and measure the current flowing.
Calculate the values of resistor required given the battery voltage and specified LED current. Demonstrate that connecting another resistor of the same value in parallel with the existing resistor results in a doubling of the current in the LED. Explain the reason to the tutor.

Removed

Section 2 – Technical aspects
1A Nature of amateur radio, types of licence and callsigns.

2a.1 Recall that more advanced classes of amateur licence exist and that they allow greater facilities and the ability to design /modify transmitting equipment.

Section 3 – Transmitters and receivers
3K Demodulation

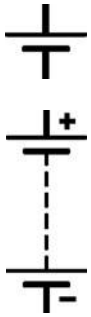
4d.1 Recall that tuning of receiver is carried out in first stages of the receiver.

Section 6 – Electro Magnetic Compatibility (EMC)
6F Station design and antenna placement/mobile installations

7c.2 Recall that anything fitted to the mains wiring must be properly made for the purpose.

Understand that home-made filters (other than ferrite rings) are potentially dangerous. Recall that information about the purchasing, making and fitting of chokes and filters is readily available from several sources.

Table 1. Symbols for use in the Class B Examination.

Description	Symbol
Cell Battery	
Fuse	
Lamp	
Resistor general	

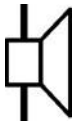
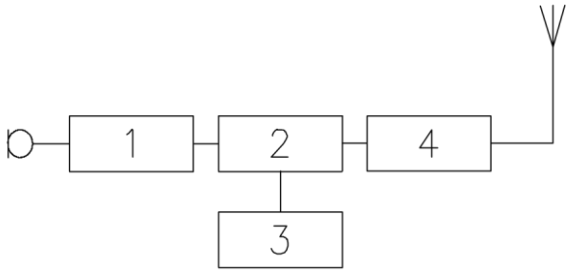
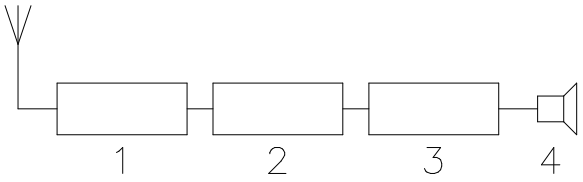
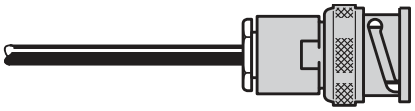
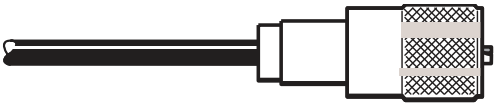
Description	Symbol
Switch s.p.s.t. Antenna	
Earth	
Microphone	
Loudspeaker	

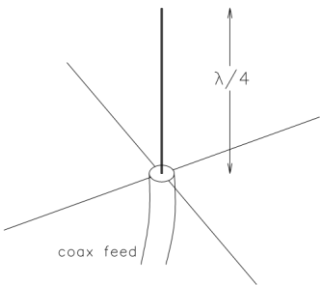
Table 2. Diagrams for use in the Class B Examination.

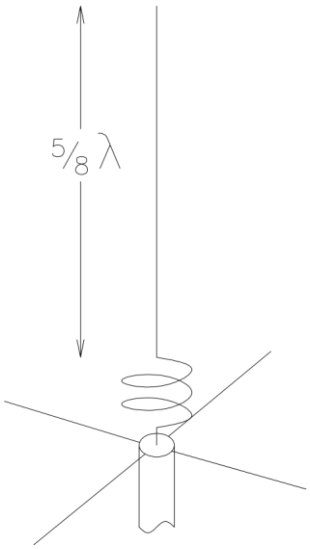
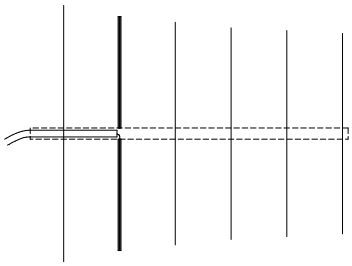
<table>
<tr>
<td>The block or “concept” diagram shown will be used for all assessment questions. It is not intended that the blocks will relate to any particular architecture of radio, merely the basic functions that need to be performed. Hence the title “concept” diagram.

The symbols for the microphone and antenna should also be known.</td>
<td> 

1. Audio stage
2. Modulator
3. Frequency generator (oscillator)
4. RF power amplifier</td>
</tr>
<tr>
<td>The block or “concept” diagram shown will be used for all assessment questions. It is not intended that the blocks will relate to any particular architecture of radio, merely the basic functions that need to be performed. Hence the title “concept” diagram.</td>
<td> 

1. Tuning and RF amplifier
2. Detection
3. Audio amplifier
4. Loudspeaker</td>
</tr>
<tr>
<td>BNC  </td>
<td>PL259  </td>
</tr>
<tr>
<td>1/4 λ ground plane

Note: Exam questions will not show the dimensions.
 
</td>
<td></td>
</tr>
</table>

	5/8 λ ground plane Note: Exam questions will not show the dimensions. 
Yagi 	Dipole 

Notes.

1. Assessment consists of practical exercises shown in sections 8e and 8f of this syllabus, which must be completed before sitting the examination. The exam consists of 25 multiple-choice questions each with 4 possible answers only one of which is correct. No marks are deducted for wrong answers. The pass mark is 18 questions correctly answered and all questions carry equal marks.
2. A Tutor Guide is available which expands on the syllabus and gives guidance on providing courses. The Guide is aimed at tutors but may also be found useful to candidates.
3. Requests for examinations should be made to MARS who will give the date and time table which is normally once a year in September depending on the number of candidates.
4. An online course is available to prospective candidates.
5. Band plans are produced and revised by the International Amateur Radio Union (IARU) in conjunction with national entities (ICTA). Consequently the Band Plan shown in the Syllabus Guide and relevant questions in the Bank, will, from time to time, lag behind the current IARU plans. The examination will be based on the simplified version shown in this syllabus. New syllabuses and guides will be issued periodically and will show the date from which they will become valid. Notice will always be given but it is incumbent on students and tutors to confirm that they are working to the current version. The effective date of the syllabus is shown on the title page, in the title block. A re-issue of the syllabus without change of operative date, indicates that no changes relevant to the examination, have been made.

Sect ion 2

Assessment Schedule

Class B Radio Amateur Examination

Question number	Syllabus Section Number	Number of Questions
1	1a.1 2a.1, 2b.1	1
2	2c.1	1
3	2c.2, 2c.3, 2c.4, 2c.5	1
4	2c.6, 2c.7	1
5	2c.8	1
6	2c.9	1
	Total Licensing Conditions	**6**
7	3a.1, 3b.1, 3b.2, 3b.3	1
8	3b.4, 3b.5, 3b.6, 3b7	1

9 & 10	3c.1, 3c.2, 3c.3	2
	Total Technical basics	**4**
11	4a.1, 4b.1, 4b.2, 4b.3	1
12	4b.4, 4b.5, 4b.6	1
13	4c.1, 4d.1, 4d.2	1
	Total Transmitters and Receivers	**3**
14	5a.1, 5a.2	1
15	5b.1, 5b.2, 5c.1, 5c.2, 5c.3	1
16	5c.4, 5c.5, 5d.1, 5e.1, 5e.2, 5f.1	1
	Total Feeder and Antenna	**3**
17	6a.1, 6a.2, 6a.3, 6a.4, 6a.5	1
18	6b.1, 6b.2	1
	Total Propagation	**2**
19	7a.1, 7a.2, 7a.3, 7a.4	1
20	7b.1, 7b.2	1
21	7c.1, 7c.2, 7c.3, 7d.1	1
	Total EMC	**3**
22& 23	8a.1, 8a.2, 8a.3, 8a.4, 8b.1, 8c.1, 8d.1	2
	Total Operating Practices and Procedures	**2**
24	9a.1, 9a.2, 9a.3, 9a.4, 9a.5, 9c.1, 9c.2, 9c.3, 9c.4, 9c.5, 9c.6, 9d.1	1
25	9a.6, 9b.1	1
	Total Safety	**2**
	Total Number of Questions	**25**

Section 3

Band Plan

SCHEDULE OF FREQUENCY BANDS FOR RADIO AMATEUR (CLASS B)			
Frequency Bands (in MHz)	**Status of allocations to the Amateur Service**	**Status of allocations to the Amateur Satellite Service**	**Maximum Peak Envelope Power level in Watts (and dB relative to 1 Watt)**
1.810-1.850	Primary.	Not allocated	10W (10 dBW)
3.500-3.800	Primary. Shared with other services	Not allocated	10W (10 dBW)
7.000-7.100	Primary	Primary	10W (10 dBW)
10.100-10.150	Secondary	Not allocated	10W (10 dBW)
14.000-14.250	Primary	Primary	10W (10 dBW)
14.250-14.350	Primary	Not allocated	10W (10 dBW)
18.068-18.168	Primary	Primary	10W (10 dBW)
21.000-21.450	Primary	Primary	10W (10 dBW)
24.890-24.990	Primary	Primary	10W (10 dBW)
28.000-29.700	Primary	Primary	10W (10 dBW)
50.00-51.00	Primary. Available on the basis of non-interference to other services inside or outside the Rep of MRU	Not allocated	10W (10 dBW)

51.00-52.00	Secondary. Available on the basis of non-interference to other services inside or outside the Rep of MRU	Not allocated	10W (10 dBW)
144.0-146.0	Primary	Primary	10W (10 dBW)
430.0-440.0	Secondary	Not allocated	10W (10 dBW)
10000-10450	Secondary	Not allocated	1W (0 dBW)
10450-10500	Secondary	Secondary	1W (0 dBW)

Section 4

Frequency Allocation Table

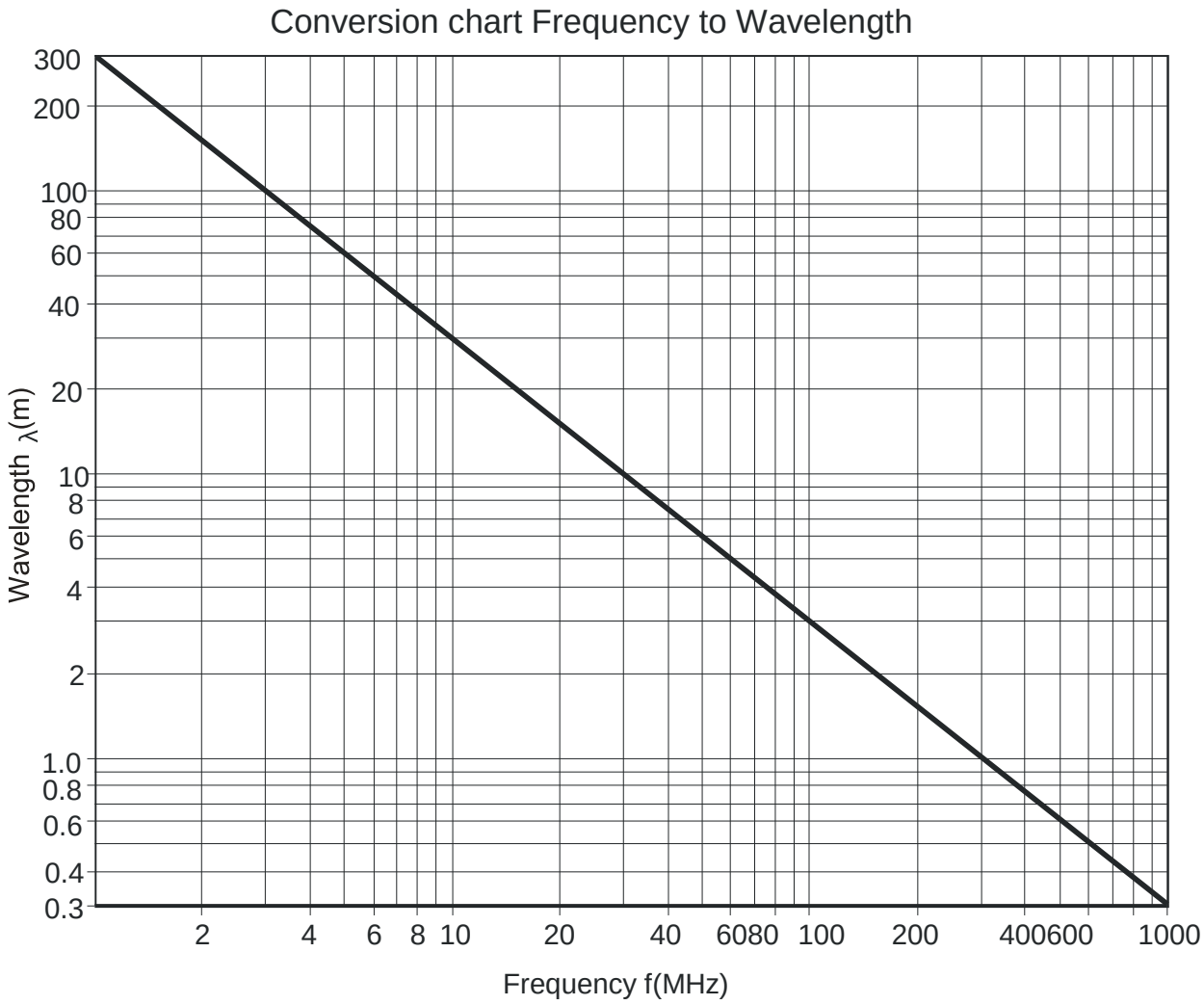
Class B Amateur Radio Examination

FREQUENCY	USE
87·5-108·0 MHz	BROADCASTING
108·0-117·975 MHz	AERONAUTICAL RADIONAVIGATION
117·975-137·0 MHz	AERONAUTICAL MOBILE
137·0-138·0 MHz	SPACE OPERATIONS & SPACE RESEARCH
138·0-144·0 MHz	LAND MOBILE
144·0-146·0 MHz	AMATEUR & AMATEUR SATELLITE
146·0-149·9 MHz	MOBILE except aeronautical mobile
149·9-150·05 MHz	RADIONAVIGATION-SATELLITE
150·05-152·0 MHz	RADIO ASTRONOMY
152·0-156·0 MHz	LAND MOBILE
156·0-158·525 MHz	MARITIME MOBILE
158·525-160·6 MHz	LAND MOBILE
160·6-160·975 MHz	MARITIME MOBILE

Section 5

Frequency to Wavelength Conversion Chart

Class B Amateur Radio Examination



Note: A larger version will be provided in the examination.