

## South Bristol Amateur Radio Club

### Lesson 0 – Introduction

#### Introduction

Welcome to the Foundation Amateur Radio Course run by South Bristol Amateur Radio Club. This course serves as an introduction to the world of Amateur Radio and equips you with the knowledge to pass the Foundation Exam and get on air.

The Foundation licence is the first step on the incentive based ladder which includes the Intermediate and Full licences. Each class of licence conveys greater levels of privilege, commensurate with the greater levels of knowledge gained through each of the exams.

Note that there is no time limit on how quickly you progress from one licence to the next, nor is there any requirement to do so

The clubs lead instructor is Steven Nash (G0UQT). Tuition is also provided by Andy Jenner (G7KNA) and Ken Rook (G4XCB), with general support given by other members of the club notably Peter Hill (G0DRX).

Club instructors give their time freely and voluntarily. We are quite prepared to answer queries between lessons, but would ask that you respect the fact that we have both jobs and other family functions to attend to. Therefore we prefer that any contact with us is made by e-mail. We will give out e-mail contact details in the lessons or you can look us up on the clubs website:

[www.sbarc.co.uk](http://www.sbarc.co.uk)

#### The Exam

OK, so lets get the bad news over with first. The exam that you will sit at the end of this course is a multiple choice exam comprising 26 questions. Each question will offer 4 possible answers of which only one will be correct, you have to identify the correct answer. The exam lasts 45 minutes and the pass mark is 19/26.

The good news is that the exam is marked on the night and you will know your results before you leave for the evening. A certificate is available from the RSGB for an additional fee for those who pass.

The cost for the exam is currently £27.50 which goes to the RSGB. We prefer all our students to become members of the club as this provides a level of pastoral support which is especially useful once you have passed your Foundation Exam. Club membership is currently £5 per annum plus £4 per annum to the Novers Park Community Centre who kindly act as our hosts. There is a weekly charge of £1 to defray room rental costs.

#### Practicals

The Foundation course employs a series of practical exercises which we normally collect together at the end of the course. These are nothing to be afraid of, just an opportunity to put into practice some of the theory that has been covered on the course. However it is essential that these practical exercises are complete and signed off by the instructor before the exam can be sat.

## **Special Needs**

If you require, or feel you require, special arrangements for the exam it is important that you identify these issues to us at an early stage so that we can, if necessary, discuss them with the RCE and RSGB to identify what provisions can be made to facilitate your progress through the course and examination. It is usually necessary for you to provide some form of evidence through a statement of special needs or other medical representation.

The onus to provide an evidence of need is on you as the candidate not us as the Course organiser. We appreciate that this can be a sensitive subject so if you wish to speak to us confidentially outside of the main lessons please feel free to approach us.

Although all cases are individual and will be assessed on an individual basis the following guidance will be applied by the RCE and RSGB:

- Candidates who can read and write should take the examination in the normal way.
- Candidates who cannot read or write may have a reader/writer to read the questions to them and mark their given answer.

Candidates needing special examination requirements are catered for according to their individual needs; for example:

- an examination paper without diagrams is produced for the registered blind
- examination papers printed onto coloured paper for candidates with dyslexia
- reasonable extra examination time is allocated when a reader/writer is required

## **Reference Material**

Throughout the course we will make reference to the RSGB publication "Foundation Licence Now!". This is available from the RSGB bookstore. However if you are not a member, we can take advantage of members discount.

## **Course Duration**

Course duration is likely to be in the region of 12 sessions including the practicals, exam preparation and the exam itself, depending on how the pace settles down.

If you intend to be away please let us know as we can reschedule activities so as not to lose course time.

**Session Schedule (Syllabus Issue 8 - 1 July 2011 onwards)**



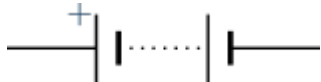

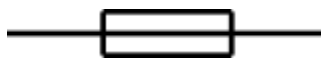
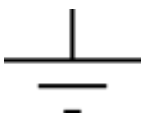
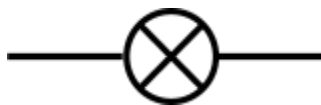
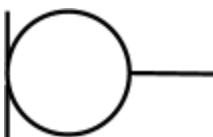

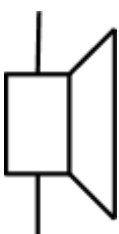
[http://www.commsfoundation.org/rce/pdf/foundationssyllabus\\_july\\_2011.pdf](http://www.commsfoundation.org/rce/pdf/foundationssyllabus_july_2011.pdf)

Session Number	Topics Covered	Syllabus Elements
1	Amateur Radio Licence Conditions	1a.1 2a.1, 2b.1, 2c.1 - 2c.9
2	Technical Basics - Part 1	3b.4 - 3b.7, 3c.1 - 3c.3
3	Transmitters Receivers	4a.1, 4b.1 - 4b.6 ac.1, 4d.1 - 4d.2
4	Technical Basics - Part 2	3a.1, 3b.1 - 3b.3
5	Feeders Antennas SWR Dummy Loads	5a.1 - 5a.2 5b.1 - 5b.2, 5c.1 - 5c.5, 5d.1 5e.1 - 5e.2 5f.1
6	Propagation EMC	6a.1 - 6a.5, 6b.1 - 6b.2 7a.1 - 7a.4, 7b.1 - 7b.2, 7c.1 - 7c.3, 7d.1
7	Operating Procedures and Practices	8a.1 - 8a.7, 8b.1, 8c.1, 8d.1
8	Safety	9a.1 - 9a.6, 9b.1, 9c.1 - 9c.6, 9d.1
9	Mock Exam and Exam Preparation	
10	<u>Practical Session</u> Tuning an FM signal Tuning an SSB signal Tuning a Data signal Tuning a Morse signal Connecting a transceiver to a power supply, antenna and feeder Adjusting a Dipole for minimum SWR	8e.1 8e.3 8e.1 8e.3 8f.1 8f.2
11	<u>Practical Session</u> VHF QSO HF QSO Morse	8e.2, 8e.5 8e.4 10a.1
12	Exam	

**Handouts and Printed Material**

The following pages contain some reference material used during the course and available in the exam in some cases:

Circuit Symbols

Description	Symbol	Description	Symbol
Cell		Switch (s.p.s.t)	
Battery		Antenna	
Fuse		Earth	
Lamp		Microphone	
Resistor (General)		Loudspeaker	

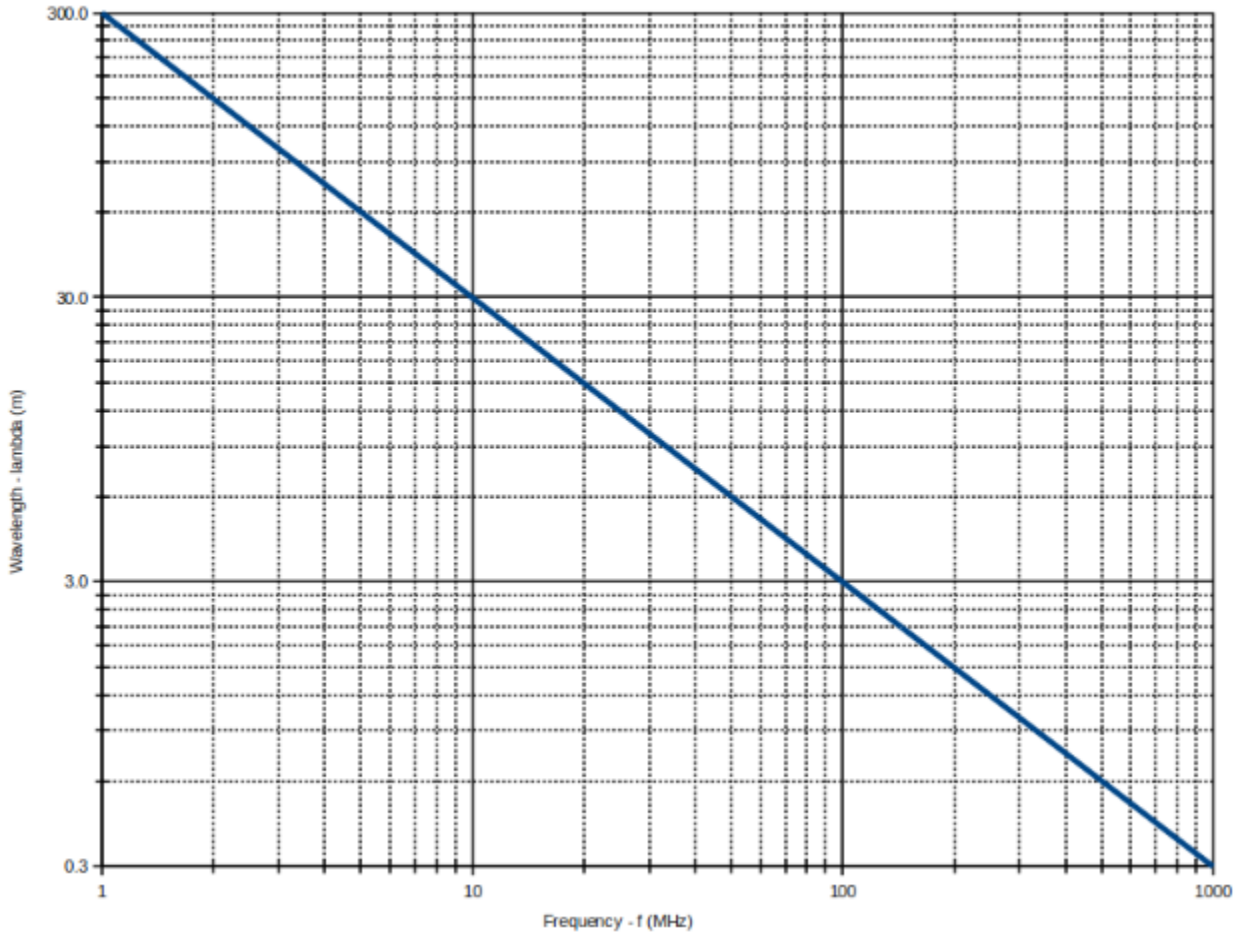
Typical Radio Frequency Allocation

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 and Space Research
138.0 - 144.0 MHz	Land Mobile
144.0 - 146.0 MHz	Amateur and 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

Table A - Foundation Licence Parameters

Frequency Bands (in MHz)	Status of Allocations in UK to the Amateur Service	Status of Allocations in UK to the Amateur Satellite Service	Maximum Peak Envelope Power level in Watts (and dB relative to 1 Watt)
0.1357 - 0.1378	Secondary. Available on the basis of non-interference to other services inside or outside the UK	Not allocated	1W (0dBW) e.r.p.
1.810 - 1.830	Primary. Available on the basis of non-interference to other services outside the UK	Not allocated	10W (10dBW)
1.830 - 1.850	Primary	Not allocated	10W (10dBW)
1.850 - 2.000	Secondary. Available on the basis of non-interference to other services inside or outside the UK	Not allocated	10W (10dBW)
3.500 - 3.800	Primary. Shared with other services	Not allocated	10W (10dBW)
7.000 - 7.100	Primary	Primary	10W (10dBW)
7.100 - 7.200	Secondary. Available on the basis of non-interference to other services inside or outside the UK	Not allocated	10W (10dBW)
10.100 - 10.150	Secondary	Not allocated	10W (10dBW)
14.000 - 14.250	Primary	Primary	10W (10dBW)
14.250 - 14.350	Primary	Not allocated	10W (10dBW)
18.068 - 18.168	Primary	Primary	10W (10dBW)
21.000 - 21.450	Primary	Primary	10W (10dBW)
24.890 - 24.990	Primary	Primary	10W (10dBW)
28.000 - 29.700	Primary	Primary	10W (10dBW)
50.00 - 51.00	Primary. Available on the basis of non-interference to other services outside the UK	Not allocated	10W (10dBW)
70.00 - 70.50	Secondary. Available on the basis of non-interference to other services inside or outside the UK	Not allocated	10W (10dBW)
144.0 - 146.0	Primary	Primary	10W (10dBW)
430.0 - 431.0	Secondary	Not allocated	10W (10dBW)
431.0 - 432.0	Secondary. Not available for use within 100km radius of Charing Cross, London (51°30'30"N, 00°07'24"W)	Not allocated	10W (10dBW)e.r.p.
432.0 - 435.0	Secondary	Not allocated	10W (10dBW)
435.0 - 438.0	Secondary	Secondary	10W (10dBW)
438.0 - 440.0	Secondary	Not allocated	10W (10dBW)
10000 - 10125	Secondary	Not allocated	1W (0dBW)
10225 - 10450	Secondary	Not allocated	1W (0dBW)
10450 - 10475	Secondary	Secondary	1W (0dBW)
10475 - 10500	Not Allocated	Secondary	1W (0dBW)

Conversion Chart: Frequency to Wavelength



### Amateur Radio Band Plans

The following band plans are largely based on that agreed at IARU Region 1 General Conferences with some local differences on frequencies above 430MHz.

14MHz (20m)	Necessary Bandwidth	UK Usage
14,000 - 14,060 kHz	200Hz	<b>Telegraph - contest preferred</b> 14,055 kHz QRS (slow telegraphy Centre of Activity)
14,060 - 14,070	200 Hz	<b>Telegraphy</b> 14.060 kHz QRP (low power) Centre of Activity
14,070 - 14,089	500 Hz	<b>Narrow band modes</b>
14,089 - 14,099	500 Hz	<b>Narrow band modes</b> - automatically controlled data stations (unattended)
14,099 - 14,101		<b>IBP - reserved exclusively for beacons</b>
14,101 - 14,112	2.7 kHz	<b>All modes</b> - automatically controlled data stations (unattended)
14,112 - 14,125	2.7 kHz	<b>All modes (excluding digimodes)</b>
14,125 - 14,300	2.7 kHz	<b>All modes</b> - SSB contest preferred segment 14,130kHz - digital voice centre of activity 14,195+- 5 kHz Priority for Dxpeditions 14,230 kHz - Image Centre of Activity. 14,285 kHz - QRP Centre of Activity
14,300 - 14,350	2.7 kHz	<b>All modes</b> 14,300 kHz Global Emergency Centre of Activity

**Licence Notes:** Amateur Service - **Primary User**  
14,000 - 14,250 kHz Amateur Satellite Service - **Primary User**

### Notes to the Band Plan

#### ITU-R Recommendation SM.328 (extract)

**Necessary bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under the specified conditions.

The use of Amplitude Modulation (AM) is acceptable in the all modes segments but users are asked to consider adjacent channel activity when selecting operating frequencies.

Foundation and Intermediate Licence holders are advised to check their licences for the permitted power limits and conditions applicable to their class of licence.

144MHz (2m)	Necessary Bandwidth	UK Usage
144.000-144.110 MHz	500Hz	<b>Telegraphy</b> (including EME CW) 144.050 MHz Telegraphy calling 144.100 MHz Random MS telegraphy calling (Note 1)
144.110-144.150	500Hz	<b>Telegraphy and MGM</b> 144.138 MHz PSK31 centre of activity EME MGM activity (Note 7)
144.150-144.180	2700Hz	<b>Telegraphy, MGM and SSB</b>
144.180-144.360	2700Hz	<b>Telegraphy and SSB</b> 144.175 MHz Microwave talk-back 144.195-144.205 MHz Random MS SSB 144.200 MHz Random MS SSB calling frequency 144.250 MHz GB2RS news broadcast and slow Morse 144.260 MHz USB. Can be used by RAYNET 144.300 MHz SSB calling
144.360-144.399	2700Hz	<b>Telegraphy, MGM, SSB</b> 144.370 MHz MGM calling frequency
144.400-144.490		<b>Propagation Beacons only</b>
144.490-144.500		144.4905MHz +/- 500Hz WSPR beacons and beacon guard band
144.500-144.794	20 kHz	<b>All Modes</b> 144.500 MHz SSTV calling 144.525 ATV SSB Talk-back 144.600 MHz RTTY calling 144.600 MHz RTTY working (FSK) 144.6125 MHz UK Digital Voice (DV) calling (Note 9) 144.625-144.675 MHz. Can be used by RAYNET 144.700 MHz FAX calling 144.750 MHz ATV Talk-back 144.775-144.794 MHz. Can be used by RAYNET
144.794-144.990	12 kHz	<b>MGM Packet radio</b> 144.800-144.9875 MHz Digital modes (including unattended) 144.8000 MHz Unconnected nets - APRS, UiView etc 144.8250 MHz Internet voice gateway 144.8375 MHz Internet voice gateway 144.8500 MHz AX25 BBS user access 144.8625 MHz Available for nodes and BBSs on application 144.8750 MHz TCP/IP user access 144.8875 MHz AX25 - priority for DX Cluster access 144.9000 MHz AX25 DX Cluster access 144.9250 MHz TCP/IP user access 144.9500 MHz AX25 BBS user access 144.9750 MHz High speed 25 kHz channel
144.990-145.1935	12 kHz	<b>FM/DV</b> RV48 - RV63 Repeater input exclusive (Note 2) (Note 5)
145.200	12 kHz	<b>FM/DV</b> Space communications (e.g. I.S.S.) - Earth-to-Space 145.2000 MHz (Note 4). Can be used by RAYNET
145.200-145.5935	12 kHz	<b>FM/DV</b> V16-V48 FM/DV simplex (Note 3) (Note 5) (Note-6)

		145.2125 MHz Internet voice gateway 145.2250 MHz Can be used by RAYNET 145.2375 MHz FM Internet voice gateway (IARU common channel) 145.2500 MHz Used for slow Morse transmissions 145.2875 MHz FM Internet voice gateway (IARU common channel) 145.3000 MHz RTTY local 145.3375 MHz FM Internet voice gateway (IARU common channel) 145.5000 MHz Mobile calling 145.5250 MHz Used for GB2RS news broadcast. 145.5500 MHz Used for rally/exhibition talk-in
<b>145.5935-145.7935</b>	12 kHz	<b>FM/DV</b> RV48 - RV63 Repeater output (Note 2)
<b>145.800</b>	12 kHz	<b>FM/DV</b> Space communications (e.g. I.S.S.) - Space-Earth
<b>145.806-146.000</b>	12 kHz	<b>All Modes</b> - Satellite exclusive

- Note 1:** Meteor scatter operation can take place up to 26kHz higher than the reference frequency.
- Note 2:** 12.5kHz channels numbered RV48-RV63. RV48 input = 145.000 MHz, output=145.600 MHz.
- Note 3:** 12.5kHz simplex channels numbered V16-V46. V16=145.200 MHz.
- Note 4:** Emergency Communications Groups utilising this frequency should take steps to avoid interference to ISS operations in non-emergency situations.
- Note 5:** Embedded data traffic is allowed with digital voice (DV)
- Note 6:** Simplex use only - no DV gateways
- Note 7:** EME activity using MGM is commonly practiced between 144.110-144.160MHz
- Note 8:** The use of Amplitude Modulation (AM) is acceptable within the All Modes segment.  
 AM usage may often be found on 144.550MHz although this frequency is not officially recognised within the 2M band plan.  
 AM users are asked to consider adjacent channel activity when selecting operating frequencies.
- Note 9:** In other countries IARU Region-1 recommend 145.375MHz

**LICENCE NOTES:** Amateur Service and Amateur Satellite Service - **Primary User**.  
 Beacons may be established for DF competitions except within 50 km of TA 012869 (Scarborough)

**Notes to the Band Plan**

**ITU-R Recommendation SM.328 (extract)**

**Necessary bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under the specified conditions.

The use of Amplitude Modulation (AM) is acceptable in the all modes segments but users are asked to consider adjacent channel activity when selecting operating frequencies.

Foundation and Intermediate Licence holders are advised to check their licences for the permitted power limits and conditions applicable to their class of licence.

Morse Code - Character to Code

Character	Code	Character	Code	Character	Code	Character	Code
A	· -	J	· - - -	S	· · ·	2	· · - - -
B	- · · ·	K	- · -	T	-	3	· · · - -
C	- · - ·	L	· - · ·	U	· · -	4	· · · · -
D	- · ·	M	- -	V	· · · -	5	· · · · ·
E	·	N	- ·	W	· - -	6	- · · · ·
F	· · - ·	O	- - -	X	- · · -	7	- - · · ·
G	- - ·	P	· - - ·	Y	- · - -	8	- - - · ·
H	· · · ·	Q	- - · -	Z	- - · ·	9	- - - - ·
I	· ·	R	· - ·	1	· - - - -	0	- - - - -

Morse Code - Code to Character

Code	Character	Code	Character	Code	Character	Code	Character
·	E	· - ·	R	- - · ·	Z	· · - - -	2
· ·	I	· - · ·	L	- - · -	Q	· · · - -	3
· · ·	S	· · - ·	F	- · ·	D	· · · · -	4
· · · ·	H	· - - ·	P	- · · ·	B	· · · · ·	5
· -	A	-	T	- · -	K	- · · · ·	6
· · -	U	- -	M	- · - ·	C	- - · · ·	7
· · · -	V	- - -	O	- - -	Y	- - - · ·	8
· - -	W	- ·	N	- ·	X	- - - - ·	9
· - - -	J	- - ·	G	· - - - -	1	- - - - -	0

Assessment Schedule

Question Number	Syllabus Section Number	Number of Questions	Percentage of Total Exam
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	
<b>Sub-Total</b>	<b>Licencing Conditions</b>	<b>6</b>	<b>23%</b>
7	3a.1, 3b.1, 3b.2, 3b.3	1	
8	3b.4, 3b.5, 3b.6, 3b.7	1	
9 & 10	3c.1, 3c.2, 3c.3	2	
<b>Sub-Total</b>	<b>Technical Basics</b>	<b>4</b>	<b>15%</b>
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	
<b>Sub-Total</b>	<b>Transmitters and Receivers</b>	<b>3</b>	<b>12%</b>
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	
<b>Sub-Total</b>	<b>Feeder and Antenna</b>	<b>3</b>	<b>12%</b>
17	6a.1, 6a.2, 6a.3, 6a.4, 6a.5	1	
18	6b.1, 6b.2	1	
<b>Sub-Total</b>	<b>Propagation</b>	<b>2</b>	<b>8%</b>
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	
<b>Sub-Total</b>	<b>EMC</b>	<b>3</b>	<b>12%</b>
22 & 23	8a.1, 8a.2, 8a.3, 8a.4, 8b.1, 8c.1, 8d.1	2	
24	8a.5, 8a.6	1	
<b>Sub-Total</b>	<b>Operating Practices &amp; Procedures</b>	<b>3</b>	<b>12%</b>
25	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	
26	9a.6, 9b.1	1	
<b>Sub-Total</b>	<b>Safety</b>	<b>2</b>	<b>8%</b>
<b>Total</b>		<b>26</b>	<b>100%</b>