Reference Data
for use in the
Intermediate Level Examination

What next:

Once your results arrive at RSGB HQ they will usually be processed within 6 working days, then your official result will be posted to you and uploaded to the Ofcom system. Results are not available any sooner.

To obtain your licence please log on to the Ofcom website www.ofcom.org.uk and follow the online instructions.

Queries:

Invigilators are not permitted to explain or comment on questions but you may draw their attention to any question you believe is wrong. Please do that before you submit your answers to allow the question number to be noted.

You may also comment on any aspect of the examination, either to the invigilators or to the RSGB Examinations Office exams@rsgb.org.uk.

All comments should be received within 5 days of the examination. Comments are dealt with in strict confidence.

Schedule 1 - Intermediate Licence Parameters

Frequency Bands	Status of Amateur Service allocation under this licence	Status of Amateur Satellite Service allocation under this licence	Maximum Peak Envelope Power level in Watts (and dB relative to 1 Watt)
135.7 to 137.8 kHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	1 W (0 dBW) ERP
1810 to 1830 kHz	Primary. Available on the basis of non-interference to other services outside the UK or Crown Dependencies.	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
1830 to 1850 kHz	Primary	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
1850 to 2000 kHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	32 W (15 dBW)
3500 to 3800 kHz	Primary. Shared with other Services.	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
7000 to 7100 kHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
7100 to 7200 kHz	Primary	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
10100 to 10150 kHz	Secondary	Not allocated	100 W (20 dBW)
14000 to 14250 kHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
14250 to 14350 kHz	Primary	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
18068 to 18168 kHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
21000 to 21450 kHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
24890 to 24990 kHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
28.0 to 29.7 MHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
50 to 51 MHz	Primary. Available on the basis of non-interference to other services outside the UK or Crown Dependencies.	Not allocated	100 W (20 dBW) 500 mW EIRP airborne
51 to 52 MHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	100 W (20 dBW)
70.0 to 70.5 MHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	100 W (20 dBW)
144 to 146 MHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
430 to 431 MHz	Secondary	Not allocated	40 W (16 dBW) ERP
431 to 432 MHz	Secondary. Not available for use within 100km radius of Charing Cross, London (51°30'30''N, 00°07'24''W).	Not allocated	40 W (16 dBW) ERP
432 to 435 MHz	Secondary	Not allocated	100 W (20 dBW)
435 to 438 MHz	Secondary	Secondary	100 W (20 dBW)
438 to 440 MHz	Secondary	Not allocated	100 W (20 dBW)
1240 to 1260 MHz	Secondary	Not allocated	100 W (20 dBW)
1260 to 1270 MHz	Secondary	Secondary. Earth to space only	100 W (20 dBW)
1270 to 1325 MHz	Secondary	Not allocated	100 W (20 dBW)
2310 to 2350 MHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	100 W (20 dBW)
2390 to 2400 MHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	100 W (20 dBW)
2400 to 2450 MHz	Secondary. Users must accept interference from ISM users.	Secondary. Users must accept interference from ISM users.	100 W (20 dBW)
3400 to 3410 MHz	Secondary. Available on the basis of non-interference to other services.	Not allocated	100 W (20 dBW)
5650 to 5670 MHz	Secondary	Secondary. Earth to space only	100 W (20 dBW)
5670 to 5680 MHz	Secondary	Not allocated	100 W (20 dBW)
5755 to 5765 MHz	Secondary. Users must accept interference from ISM users.	Not allocated	100 W (20 dBW)
5820 to 5830 MHz	Secondary. Users must accept interference from ISM users.	Not allocated	100 W (20 dBW)
5830 to 5850 MHz	Secondary. Users must accept interference from ISM users.	Secondary. Users must accept interference from ISM users. Space to Earth only.	100 W (20 dBW)

Schedule 1 - Intermediate Licence Parameters - cont.

Frequency Bands	Status of Amateur Service allocation under this licence	Status of Amateur Satellite Service allocation under this licence	Maximum Peak Envelope Power level in Watts (and dB relative to 1 Watt)
10.000 to 10.125 GHz	Secondary	Not allocated	100 W (20 dBW)
10.225 to 10.450 GHz	Secondary	Not allocated	100 W (20 dBW)
10.450 to 10.475 GHz	Secondary	Secondary	100 W (20 dBW)
10.475 to 10.500 GHz	Not allocated	Secondary	100 W (20 dBW)
24.00 to 24.05 GHz	Primary. Users must accept interference from ISM users.	Primary. Users must accept interference from ISM users.	100 W (20 dBW) 500 mW EIRP airborne
24.05 to 24.15 GHz	Secondary. May only be used with the written consent of Ofcom. Users must accept interference from ISM users.	Not allocated	100 W (20 dBW)
24.15 to 24.25 GHz	Secondary	Not allocated	100 W (20 dBW)
47.0 to 47.2 GHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
75.500 to 75.875 GHz	Secondary	Secondary	100 W (20 dBW)
75.875 to 76.000 GHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
76.0 to 77.5 GHz	Secondary	Secondary	100 W (20 dBW)
77.5 to 78.0 GHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
78 to 79 GHz	Secondary	Secondary	100 W (20 dBW)
79 to 81 GHz	Secondary	Secondary	100 W (20 dBW)
122.25 to 123.00 GHz	Secondary	Not allocated	100 W (20 dBW)
134 to 136 GHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne
136 to 141 GHz	Secondary	Secondary	100 W (20 dBW)
241 to 248 GHz	Secondary	Secondary	100 W (20 dBW)
248 to 250 GHz	Primary	Primary	100 W (20 dBW) 500 mW EIRP airborne

Formula Sheet

This formula sheet may be used to answer any question

Ohm's Law $V = IR$	Power $P = V \times I$
Series $R_T = R_1 + R_2 + R_3$	Parallel $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
Potential divider $V_{out} = V_{in} \frac{R_2}{R_1 + R_2}$	
Series $\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$	Parallel $C_T = C_1 + C_2 + C_3$
Series $L_T = L_1 + L_2 + L_3$	Parallel $\frac{1}{L_T} = \frac{1}{L_1} + \frac{1}{L_2}$
AC $V_{rms} = \frac{V_{peak}}{\sqrt{2}}$	AC $t = \frac{1}{f}$ $f = \frac{1}{t}$
Inductor $X_L = 2\pi fL$	Capacitor $X_C = \frac{1}{2\pi fC}$
Tuned circuit $Q = \frac{f_C}{f_U - f_L} = \frac{\text{centre frequency}}{\text{bandwidth}}$	
Transformer $V_s = V_p \frac{N_s}{N_p}$	Transformer $I_p = I_s \frac{N_s}{N_p}$
Transistor $I_C = \beta I_B$	
Velocity of radio waves in free space $v = 3 \times 10^8$ m/s = 300,000,000 m/s	Frequency & wavelength $v = f\lambda$
antenna erp = power × gain (linear)	

Resistor Colour Code

Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9
Silver	10%
Gold	5% or ÷ 10

144MHz (2m)	NECESSARY BANDWIDTH	UK USAGE
144.000-144.025MHz	2700Hz	All Modes – including Satellite Downlinks
144.025-144.100	500Hz	Telegraphy (including EME CW) 144.050MHz – Telegraphy Centre of Activity 144.100MHz – Random MS Telegraphy Calling, (Note 1)
144.110-144.150	500Hz	Telegraphy and MGM EME MGM Activity (Note 7)
144.150-144.400	2700Hz	Telegraphy, MGM and SSB 144.175MHz – Microwave Talk-back 144.200MHz – Random MS SSB 144.250MHz – GB2RS News Broadcast and Slow Morse 144.260MHz – See Note 10 144.300MHz – SSB Centre of Activity 144.370MHz – MGM MS Calling
144.400-144.490		Propagation Beacons only
144.490-144.500		Beacon guard band 144.491-144.493 Personal Weak Signal MGM Beacons (BW: 500Hz max)
144.500-144.794	20kHz	All Modes (Note 8) 144.500MHz – Image Modes Centre (SSTV, FAX, etc) 144.600MHz – Data Centre of Activity (MGM, RTTY, etc) 144.6125MHz – UK Digital Voice (DV) Calling (Note 9) 144.625-144.675MHz – See Note 10 144.750MHz – ATV Talk-back 144.775-144.794MHz – See Note 10
144.794-144.990	12kHz	MGM Digital Communications (Note 15) 144.800-144.9875MHz – MGM/Digital Communications 144.8000MHz – Unconnected Nets – APRS, UiView etc (Note 14) 144.8125MHz – DV Internet Voice Gateway 144.8250MHz – DV Internet Voice Gateway 144.8375MHz – DV Internet Voice Gateway 144.8500MHz – DV Internet Voice Gateway 144.8625MHz – DV Internet Voice Gateway 144.9250MHz – TCP/IP Usage 144.9375MHz – AX25 Usage 144.9500MHz – AX25 Usage 144.9625MHz – FM Internet Voice Gateway 144.9750MHz, 144.9875MHz To Be Decided (Note 11)
144.990-145.1935	12kHz	FM/DV RV48-RV63 Repeater Input Exclusive (Note 2 & 5)
145.200	12kHz	FM/DV Space Communications (eg ISS) – Earth-to-Space 145.2000MHz – (Note 4 & 10)
145.200-145.5935	12kHz	FM/DV V16-V47 – FM/DV Simplex (Note 3, 5 & 6) 145.2250MHz – See Note 10 145.2375MHz – FM Internet Voice Gateway (IARU common channel) 145.2500MHz – Used for Slow Morse Transmissions 145.2875MHz – FM Internet Voice Gateway (IARU common channel) 145.3375MHz – FM Internet Voice Gateway (IARU common channel) 145.5000MHz – FM Calling (Note 12) 145.5250MHz – Used for GB2RS News Broadcast. 145.5500MHz – Used for Rally/exhibition Talk-in 145.5750MHz, 145.5875MHz (Note 11)
145.5935-145.7935	12kHz	FM/DV RV48-RV63 – Repeater Output (Note 2)
145.800	12kHz	FM/DV Space Communications (eg ISS) – Space-Earth
145.806-146.000	12kHz	All Modes – Satellite Exclusive

14MHz (20m)	NECESSARY BANDWIDTH	UK USAGE
14,000-14,060kHz	200Hz	Telegraphy – Contest Preferred 14,055kHz – QRS (slow telegraphy) Centre of Activity
14,060-14,070	200Hz	Telegraphy 14,060kHz – QRP (low power) Centre of Activity
14,070-14,089	500Hz	Narrowband Modes
14,089-14,099	500Hz	Narrowband Modes – Automatically Controlled Data Stations (unattended)
14,099-14,101		IBP – Reserved Exclusively for Beacons
14,101-14,112	2.7kHz	All Modes – Automatically Controlled Data Stations (unattended)
14,112-14,125	2.7kHz	All Modes (excluding digimodes)
14,125-14,300	2.7kHz	All Modes – SSB Contest Preferred Segment 14,130kHz – Digital Voice Centre of Activity 14,195 ±5kHz – Priority for DXpeditions 14,230kHz – Image Centre of Activity 14,285kHz – QRP Centre of Activity
14,300-14,350	2.7kHz	All Modes 14,300kHz – Global Emergency Centre of Activity

14MHz (20m) Licence Notes
Amateur Service – Primary User. 14,000-14,250kHz
Amateur Satellite Service – Primary User.

Radio Society of Great Britain
Intermediate Licence Amateur Radio Band Plans

For Examination use only

144MHz (2m) Licence Notes

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 = 145.000MHz, output = 145.600MHz.
Note 3: 12.5kHz simplex channels numbered V16-V47. V16 = 145.200MHz.
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 practised between 144.110-144.160MHz.
Note 8: Amplitude Modulation (AM) is acceptable within the All Modes segment. AM usage is typically found on 144.550MHz. Users should consider adjacent channel activity when selecting operating frequencies.
Note 9: In other countries IARU Region 1 recommends 145.375MHz.
Note 10: May be used for Emergency Communications and Community Events.
Note 11: May be used for repeaters in other IARU Region 1 countries.
Note 12: DV users are asked not to use this channel, and use 144.6125MHz for calling.
Note 13: Not used.
Note 14: 144.800 use should be NBFM to avoid interference to 144.8125 DV Gateways.

Licence Notes: Amateur Service and Amateur Satellite Service – Primary User. Specific conditions apply within 50 km of TA 012869 (Scarborough)

Notes to the bandplans

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 specified conditions.

All Modes: CW, SSB and those modes listed as Centres of Activity, plus AM. Consideration should be given to adjacent channel users.

Image Modes: Any analogue or digital image modes within the appropriate band- width, for example SSTV and FAX.

Narrowband Modes: All modes using up to 500Hz bandwidth, including CW, RTTY, PSK, etc.

Digimodes: Any digital mode used within the appropriate bandwidth, for example RTTY, PSK, MT63, etc.

Sideband usage: Below 10MHz use lower sideband (LSB), above 10MHz use upper sideband (USB). Note the lowest dial set- tings for LSB Voice modes are 1843, 3603 and 7043kHz on 160, 80 and 40m. Note that on (5MHz) USB is used.

Amplitude Modulation (AM): AM with a bandwidth greater than 2.7kHz is accept- able in the All Modes segments provided users consider adjacent channel activity when selecting operating frequencies (Davos 2005).

Extended SSB (eSSB): Extended SSB (eSSB) is only acceptable in the All Modes segments provided users consider adjacent channel activity when selecting operating frequencies.

Digital Voice (DV): Users of Digital Voice (DV) should check that the channel is not in use by other modes (CT08_C5_Rec20).

FM Repeater & Gateway Access: CTCSS Access is recommended. Toneburst access is being withdrawn in line with IARU-R1 recommendations.

MGM: Machine Generated Modes indicates those transmission modes relying fully on computer processing such as RTTY, AMTOR, PSK31, JTxx, FSK441 and the like. This does not include Digital Voice (DV) or Digital Data (DD).

WSPR: Above 30MHz, WSPR frequencies in the band plan are the centre of the transmitted frequency (not the suppressed carrier frequency or the VFO dial setting).