

HOME OFFICE  
WIRELESS TELEGRAPHY ACT, 1949

AMATEUR LICENCE B

Date of issue 25 JUNE 1982 Fee on issue £8.00  
Renewable 15 JUNE in each year Fee on renewal £8.00  
Call Sign .....

1. (1) Licence .....

of .....  
(hereinafter called "the Licensee") is hereby licensed, subject to the terms, provisions and limitations herein contained:

(a) to establish in the United Kingdom an amateur sending and receiving station for wireless telegraphy (hereinafter called "the Station"):

- (i) At the above address  
(hereinafter called "the main address") or
- (ii) At any premises (hereinafter called "the temporary premises") or any location (hereinafter called "the temporary location") for separate periods none of which shall exceed four consecutive weeks; or
- (iii) At any premises (hereinafter called "the alternative premises") provided that at least 7 days before the Station is established at the alternative premises notice in writing of the postal address of the alternative premises is given to the General Manager of the Post Office Telephone Area in which the alternative premises are situated or, in the case of the Channel Islands to the Director of the Telecommunications Board of the appropriate Bailiwick. The said General Manager or Director shall also be notified in writing when the Station is no longer established at the alternative premises; or
- (iv) in any vehicle or vessel but not on the sea or within any estuary, dock or harbour;
- (v) as a pedestrian;

(b) to use the Station for the purpose of sending to, and receiving from, other licensed amateur stations as part of the self-training of the Licensee in communication by wireless telegraphy;

- (i) Messages in plain language which are remarks about matters of a personal nature in which the Licensee, or the person with whom he is in communication, has been directly concerned;
- (ii) Facsimile Signals;
- (iii) Radio Teleprinter Signals;
- (iv) Visual Images;
- (v) Signals (not being in secret code or cypher) which form part of, or relate to, the transmission of such messages, signals or images.

(c) to use the Station, as part of the self-training of the Licensee in communication by wireless telegraphy, during disaster relief operations conducted by the British Red Cross Society, the St John Ambulance Brigade, the Emergency County Planning Officer, or any police force in the United Kingdom or during any exercise relating to such operations, for the purpose of sending to other licensed amateur stations such messages as the Licensee may be requested by the said Society, Brigade, Emergency County Planning Officer or police force to send, and of receiving from any other licensed amateur station such messages as the person licensed to use such other licensed amateur station may be requested by the said Society, Brigade, Emergency County Planning Officer or such police force to send:

(d) to use the Station for the purpose of receiving transmissions in the Standard Frequency Service.

(2) Limitations. The foregoing Licence to establish and use the Station is subject to the following limitations:

- (a) The Station shall not be established or used in an aircraft or a public transport vehicle.
- (b) The Station shall be used only with emissions which are of the classes specified in the Schedule hereto and are within the frequency bands specified in the Schedule hereto in relation to those respective classes of emission, and with a power not exceeding that specified in the Schedule hereto in relation to the class of emission and frequency band in use at the time.
- (c) The Station shall be operated only (i) by the Licensee personally, or (ii) in the presence and under the direct supervision of the Licensee, by any other person who holds a current wireless telegraphy licence issued by the Secretary of State to use another amateur station or who holds an Amateur Radio Certificate issued by the Secretary of State.
- (d) Messages other than initial calls shall not be broadcast to amateur stations in general, but shall be sent only to (i) amateur stations with which communication is established separately and singly, or (ii) groups of particular amateur stations provided that communication is first established separately and singly with each station in any such group.
- (e) When the Station is used for the purpose of sending messages by the type of transmission known as Radio Teleprinter (RTTY) it shall be used only with International Telegraph Code No. 2(5 – Unit Start-Stop) and with speeds of transmission of 45.5 or 50 bauds.
- (f) No message which is grossly offensive or of an indecent or obscene character shall be sent.

2. International Requirement. The Licensee shall observe and comply with the relevant provisions of the Telecommunication Convention.

3. Frequency Control and Measurement.

- (1) A satisfactory method of frequency stabilisation shall be employed in the sending apparatus comprised in the Station.
- (2) Equipment shall be provided capable of verifying that the sending apparatus comprised in the Station is operating with emissions within the authorised frequency bands.

4. Non-Interference.

- (1) The apparatus comprised in the Station shall be so designed, constructed, maintained and used that the use of the Station does not cause any undue interference with any wireless telegraphy.
- (2) 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 to the class of emission in use. In particular, the radiation of harmonics and other spurious emissions shall be suppressed to such a level that they cause no undue interference with any wireless telegraphy. To ensure that the requirements of this subclause are met, tests shall be made from time to time and details of those tests shall be recorded in the Log as required in clause 6 hereof.

5. Operators and access to Apparatus. The Licensee shall not permit or suffer any unauthorised person to operate the Station or to have access to the apparatus comprised therein. The Licensee shall ensure that persons operating the Station shall observe the terms, provisions and limitations of this Licence at all times.

6. Log.

(1) An indelible record shall be kept in one book (not loose-leaf) (in this Licence called "the Log") showing the following:

(Fixed Station)

- (a) Date
- (b) Time of commencement of period of operation of the Station.
- (c) Call signs of the stations from which messages addressed to the Station are received or to which messages are sent, times of establishing and ending communication with each such station, frequency band(s) and class or classes of emission in each case (including the tests referred to in clause 4(2) hereof; and CQ calls).
- (d) Time of closing down the Station.

(e) The address of the temporary premises or the alternative premises or particulars of the temporary location when the Station is established other than as provided in clause 1(1)(a)(i) hereof.

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

(Mobile Station or as a Pedestrian)

(g) Entries made in respect of calls made when operating from a vehicle or vessel, or as a pedestrian should be made as soon as practicable after the end of a journey and must consist of date, geographical area of operation, frequency band(s) used and time of commencement and end of journey. A separate log book may be maintained for mobile or pedestrian use.

(2) If the Station is at any time operated by a person other than the Licensee (see clause 1(2)(c)(ii) hereof) the Licensee shall ensure that the Log is signed by that person with his full name, and that the call sign of the station which he is licensed to use, or (if there is no such station) the number of his Amateur Radio Certificate, is shown in the Log.

(3) All times shall be stated in GMT.

7. Receiver. The Station shall be equipped for the reception of messages sent on the frequency or frequencies, and by means of the class or classes of emission, which are in current use at the Station for the purpose of sending.

8. Recorded messages.

(1) Messages addressed to the Station from any licensed amateur station with which the Licensee is in communication may be recorded and retransmitted in accordance with this Licence, provided that the retransmission is intended for reception by the originating station only, and that the call sign of that station is not included in the retransmission.

(2) Modulation is prohibited by means of recordings of any kind other than special recordings of sinusoidal tone or tones within the audio frequency spectrum which may be either constant or steadily changing in frequency.

(3) Gramophone or tape recordings of the type intended for entertainment purposes may not be transmitted for any purpose.

9. Call Sign and notification of location.

(1) Whenever the Station is used the call sign mentioned on the first page of this Licence shall be transmitted: provided that when the Station is used:

(a) at an address other than the main address the Licensee shall, in order to indicate the country or place of use, vary the prefix letter to the call sign by using the prefix letter appropriate to that country or place, being G for England, GM for Scotland, GW for Wales, GI for Northern Ireland, GJ for Jersey, GU for Guernsey and GD for the Isle of Man;

(b) at the temporary premises the suffix "/A" shall be added to the call sign;

(c) at the temporary location or as a pedestrian the suffix "/P" shall be added to the call sign;

(d) in or on a vehicle or vessel the suffix "/M" shall be added to the call sign.

(2) The call sign shall be sent for identification purposes at the beginning and at the end of each period of sending, and whenever the frequency is changed. When the period of use exceeds 15 minutes the call sign shall be repeated (in the same manner) at the commencement of each succeeding period of 15 minutes.

(3) The letters of the call sign may be confirmed by the pronouncement of well-known words of which the initial letters are the same as those in the call sign; but words used in this manner shall not be of a facetious or objectionable character.

(4) When the Station is used at the temporary premises or location, the address of the temporary premises or location shall be sent at the beginning and end of the establishment of communication with each separate amateur station, or at intervals of 15 minutes, whichever is the more frequent.

(5) When sending high definition television signals, the call sign sent for identification purposes must be adjusted to the centre of the video channel.

10. **Inspection.** The Station, this Licence and the Log shall be available for inspection at all reasonable times by a person acting under the authority of the Secretary of State.

11. **Station to close down.** The Station shall be closed down at any time on the demand of a person acting under the authority of the Secretary of State.

12. **Period of Licence, Renewal, Revocation and Variation.** This Licence shall continue in force for one year from the date of issue, and thereafter so long as the Licensee pays to the Secretary of State in advance in each year on or before the anniversary of the date of issue the renewal fee prescribed by or under the regulations for the time being in force under section 2(1) of the Wireless Telegraphy Act, 1949; Provided that the Secretary of State may at any time after the date of issue (i) revoke this Licence or vary the terms, provisions or limitations thereof by a notice in writing served on the Licensee, or by a general notice published in the London, Edinburgh and Belfast Gazettes, or in a newspaper published in London, a newspaper published in Edinburgh and a newspaper published in Belfast addressed to all holders of Amateur Licences A, (ii) revoke this Licence by a general notice published by being broadcast by the British Broadcasting Corporation addressed to all holders of Amateur Licences B. Any notice given under this clause may take effect either forthwith or on such subsequent date as may be specified in the notice.

13. This Licence is not transferable.

14. **Return of Licence.** This Licence shall be returned to the Secretary of State when it has expired or been revoked.

15. **Previous Licences Revoked.** Any licence, however described, which the Secretary of State has previously granted to the Licensee in respect of the Station is hereby revoked.

16. **Interpretation.**

(1) In this Licence:—

(a) The expressions —

(i) “the Secretary of State” shall mean the Secretary of State for the Home Department;

(ii) “messages” and “signals” shall include visual images sent by television and facsimile transmission;

(iii) “remarks about matters of a personal nature” shall not include messages about business affairs;

(iv) “Standard Frequency Service” shall have the same meaning as in the Radio Regulations and Additional Radio Regulations in force under the International Telecommunication Convention signed at Malaga-Torremolinos on the 25th day of October 1973, where it is defined as “A radio-communication service for scientific, technical and other purposes, providing the transmission of specific frequencies of stated high precision, intended for general reception”.

(v) “the Telecommunication Convention” shall mean the International Telecommunication Convention signed at Malaga-Torremolinos on the 25th day of October 1973, and the Radio Regulations and Additional Radio Regulations in force thereunder and includes any Convention and Regulations which may from time to time be in force in substitution for or in amendment of the said Convention or the said Regulations;

(vi) “the United Kingdom” shall mean the United Kingdom of Great Britain and Northern Ireland, the Isle of Man and the Channel Islands.

(b) References to the operation of the Station shall include references to the speaking into the microphone comprised in the Station;

(c) References to a certificate issued or granted by the Secretary of State shall include references to a certificate issued or granted by the Postmaster General or Minister of Posts and Telecommunications.

(d) Except where the context otherwise requires other words and expressions shall have the same meaning as they have in the Wireless Telegraphy Act 1949 or in the Regulations made under Part 1 thereof.

(2) Section 19(5) of the Wireless Telegraphy Act 1949, shall apply for the purposes of this Licence as it applies for the purpose of the Act.

(3) Nothing in this Licence shall be deemed to authorise the use of the Station for business, advertisement or propaganda purposes or (except as provided by clause 1(1)(c) hereof) for the sending or receiving of news or messages of or on behalf of, or for the benefit or information of any social, political, religious or commercial organisation, or anyone other than the Licensee or the person with whom he is in communication.

*B. Long*

for the SECRETARY OF STATE FOR THE HOME DEPARTMENT

THE SCHEDULE

Frequency Bands in MHz	Footnote No.	Power Limitations		Classes of Emission (see C and D overleaf)
		Carrier Power supplied to the Antenna	Peak Envelope Power supplied to Antenna for SSB Operation	
144.0 - 146.0	9,11,12,16&18	20 dBW	26 dBW	A3E
430.0 - 432.0	1, 6, 7, & 18	see f/note 7	see f/note 7	
432.0 - 435.0	1, 10 & 18	20 dBW	26 dBW	
435.0 - 438.0	1, 10, 14 & 18			
438.0 - 440.0	1, 10 & 18			
Frequency Bands in MHz	Footnote No.	Maximum DC input Power (see A & B overleaf)	SSB Operation	R3E
1240.0 - 1260.0	1, 10, 17 & 18	150 watts	26 dBW	H3E
1260.0 - 1270.0	1,14,15,17&18			J3E
1270.0 - 1325.0	1, 10, 17&18			F3E
2300.0 - 2400.0	1, 10, 17&18			G3E
2400.0 - 2450.0	1,10,13,14,17&18			
3400.0 - 3475.0	1, 17 & 18			
5650.0 - 5670.0	1,10,13,14,15, 17&18			
5670.0 - 5680.0	1, 10, 17 & 18			
5755.0 - 5765.0	1, 10, 17 & 18			
5820.0 - 5830.0	1, 10, 17 & 18			
5830.0 - 5850.0	1,10,13,14,15, 17&18			
10,000 - 10,450	1, 10, 17 & 18			
10,450 - 10,500	1,10,13,14, 17 & 18			
24,000 - 24,050	8,10,12,17&18			
24,050 - 24,250	1,8,10,17&18			
2350.0 - 2400.0	1,5,13,17&18	25 watts mean power & 2.5 kilo- watts peak power	K3E L3E	
10,050 - 10,450	1, 5, 17 & 18			
5755.0 - 5765.0 5820.0 - 5850.0	1,5,13,17&18			

FOOTNOTES:-

1. This band is allocated to stations in the amateur service on a secondary basis on condition that they shall not cause interference to other services.
2. -
3. -
4. -
5. Use by the Licensee of any frequency in this band shall be only with the prior written consent of the Secretary of State.
6. This band is not available for use within the area bounded by  $53^{\circ}\text{NO}2\text{E}$ ,  $55^{\circ}\text{NO}2\text{E}$ ,  $53^{\circ}\text{NO}3\text{W}$  and  $55^{\circ}\text{NO}3\text{W}$ .
7. In this band the power must not exceed 10 dBW erp (effective radiated power).
8. Use by the Licensee of any frequency in this band shall only be with written consent of the Secretary of State and such consent shall indicate the power which may be used, taking into consideration the characteristics of the Licensee's station.
9. Slow Scan Television may be used in this band.
10. High Definition Television (A3F, C3F, F3F, G3F) may be used in this band.
11. Facsimile Transmission (A3C, F3C, G3C) may be used in this band, with a bandwidth not greater than 6 kHz.
12. The amateur-satellite service also has an allocation in this band.
13. This band is allocated to stations in the amateur-satellite service on a secondary basis, on condition that they shall not cause interference to other services.
14. The amateur-satellite service may operate in this band in accordance with International Radio Regulation 2/41, viz:  
  
Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in Article 22 of the Radio Regulations. (Administrations authorising such space stations shall inform the IFRB and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference which might be reported can be terminated by the authorising administration (see RR 2612).)
15. The use of the amateur-satellite service in the following bands shall be limited to the direction stated below:-

1260 - 1270 MHz Earth to Space  
5650 - 5670 MHz Earth to Space  
5830 - 5850 MHz Space to Earth

16. The 144 MHz band may, in the event of natural disasters, be used by non-amateur stations to meet the needs of international emergency communications in the disaster area in accordance with regulations of the Radio Regulatory Department.

17. Since high intensities of RF radiation may be harmful, the following safety precaution must be taken: in locations to which people have access, the power density on transmit must not exceed the limits recommended by the competent authorities. Currently this limit is 10 mW/cm<sup>2</sup>.

18. Data transmission may be used within the frequency bands 144 MHz and above provided (a) the Station callsign is announced in telephony at least once every 15 minutes and (b) emission is contained within the bandwidth normally used for telephony.

- A. DC input power is the total direct current power input to (i) the anode circuit of the valve(s) or (ii) any other device energising the antenna.
- B. As an alternative for R3E and J3E single sideband types of emission, the power shall be determined by the peak envelope power (PEP) under linear operation.
- C. Double sideband suppressed carrier emissions are permitted within the terms of this licence.
- D. The symbols used to designate the classes of emission have the meaning assigned to them in the Telecommunication Convention. They are:-

Amplitude Modulation

A3E Telephony, double sideband.

A3C Facsimile Transmission.

H3E Telephony using single sideband full carrier, amplitude modulation.

R3E Telephony, single sideband, reduced carrier.

J3E Telephony, single sideband, suppressed carrier.

A3F/C3F Slow Scan Television and High Definition Television

Frequency Modulation

F3E Telephony.

F3C Facsimile Transmission.

F3F Slow Scan Television and high definition television.

Phase Modulation

G3E Telephony.

G3C Facsimile Transmission

G3F Slow Scan Television and High Definition Television



Pulse Modulation

K3E Telephony, amplitude modulated pulses.

L3E Telephony, width (or duration) modulated pulses.

#### CLASSIFICATION OF EMISSIONS

##### Basic Characteristics

The basic characteristics of a radio emission are described by three symbols as follows:-

- (i) first symbol - type of modulation of the main carrier.
- (ii) second symbol - nature of Signal(s) modulating the main carrier.
- (iii) third symbol - type of information to be transmitted.

##### INTERPRETATION

- (i) Carrier Power of a Radio Transmission. The average power supplied to the antenna from a transmitter during one radio frequency cycle under conditions of no modulation. This interpretation does not apply to pulse modulated emissions.
- (ii) Peak Envelope Power of a Radio Transmitter. The average power supplied to the antenna by a transmitter during one radio frequency cycle at the highest crest of the modulation envelope, taken under consideration of normal operation.
- (iii) Effective Radiated Power (e.r.p) (in a given direction): The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

## NOTES

- (a) The Secretary of State should be notified promptly of any change in the correspondence address of the Licensee. Except as provided in (b) below, correspondence should be sent to the Home Office, Radio Regulatory Department, Radio Regulatory Division, Waterloo Bridge House, Waterloo Road, LONDON, SE1 8UA.
- (b) Remittances and correspondence about payments to the Secretary of State required under this Licence should be sent to The Cashier, Accounts Branch, Tolworth Tower, Ewell Road, Surbiton, Surrey KT6 7DS. It is unnecessary to send the Licence when making remittances.
- (c) Clause 4(1) of the Licence requires that the apparatus comprised in the Station shall be so designed, constructed, maintained and used that the use of the Station does not cause any undue interference with any wireless telegraphy. In order to prevent interference due to close coupling of aerials, the aerial to be used for the Station should be sited as far as possible from any existing television or other receiving aerials in the vicinity. This is particularly important if it is proposed to instal an indoor transmitting aerial, eg in the loft, where interference may be conducted through the electricity supply wiring. In some circumstances it might not be possible to use an indoor aerial.
- (d) If the Station is situated within half a mile of the boundary of any aerodrome, the height of the aerial or any mast supporting it must not exceed 50 feet above the ground level. An aerial which crosses above or is liable to fall or to be blown on to any overhead power wire (including electric lighting and tramway wires) or power apparatus must be guarded to the reasonable satisfaction of the owner of the power wire or power apparatus concerned.
- (e) Demands for closing down (see clause 11) can be expected to be received in connection with national emergencies or when interference is being caused to a Government wireless station or other important services. An oral demand by a person acting under the authority of the Secretary of State to close down the Station will be confirmed in writing.
- (f) Under Section 1 of the Wireless Telegraphy Act, 1949, it is an offence to use any station or apparatus for wireless telegraphy except under and in accordance with a licence granted by the Secretary of State. Breach of this provision may result in this Licence being revoked and the offender being prosecuted.
- (g) If any message, the receipt of which is not authorised by this Licence, is received by means of the Station, neither the Licensee nor any person operating the Station should make known the contents of any such message, its origin or destination, its existence or the fact of its receipt to any person except a duly authorised officer of Her Majesty's Government, a person acting under the authority of the Secretary of State, or a competent legal tribunal, and should not retain any copy or make any use of any such message, or allow it to be reproduced in writing, copied or made use of. It is an offence under section 5 of the Wireless Telegraphy Act, 1949, deliberately to receive messages the receipt of which is unauthorised or (except in the special circumstances mentioned in that section of the Act) to disclose any information as to the contents, sender or addressee of any such message.
- (h) It is an offence under Section 5 of the Wireless Telegraphy Act, 1949, to send by wireless telegraphy certain misleading messages.
- (i) This Licence does not authorise the Licensee to do any act which is an infringement of any copyright which may exist in the matter sent or received.
- (j) This Licence does not absolve the Licensee from obtaining any necessary consent before entering on private or public property with any apparatus.
- (k) The Secretary of State regards himself as free to publish the Licensee's name and address at his discretion unless within one month of the date of issue of this Licence the Licensee specifically asks that this should not be done.
- (l) The expression "wireless telegraphy" used in this Licence has the meaning assigned to it in the Wireless Telegraphy Act, 1949, and includes radiotelephony.
- (m) With reference to clause 9(3) of this Licence it is recommended that for uniformity the phonetic alphabet contained in appendix 16 of the Radio Regulations, Geneva, 1976, reproduced below should be used when the letters of the call sign are transmitted phonetically.

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

## FREQUENCY-CHECKING EQUIPMENT IN AMATEUR STATIONS

The Home Office receives many enquiries seeking advice on suitable apparatus for frequency measurement for use in amateur stations. Particular makes and types of equipment cannot be endorsed or recommended, but the following notes should act as a guide to Home Office requirements.

1. A licensee must:-
  - (a) be able to verify that his transmissions are within the authorized frequency band, (i.e. that no appreciable energy is radiated outside the band).
  - (b) use a satisfactory method of frequency control.
  - (c) ensure that his transmissions do not contain unwanted frequencies (i.e. harmonics and spurious frequencies).
2. When his station is inspected by officers authorised by the Secretary of State, the licensee will be expected to demonstrate that he can conform with the requirements (a) to (c) above.
3. As a general rule, a station requires a crystal reference source to comply with 1(a) and (b) above so that:-
  - (a) with a crystal-controlled transmitter an absorption device of suitable frequency range and accuracy is necessary to check that the desired harmonic of the crystal frequency is selected.
  - (b) with a transmitter that is not crystal-controlled a wavemeter based on a crystal oscillator is necessary.Within these outline requirements the licensee is free to decide how he will meet the licence regulations.
4. The following comments may provide useful guidance:

(a) **Frequency measuring equipment** should be of sufficient accuracy to verify that emissions are within the authorised frequency bands. For example, operation in the centre of the 21.0 – 21.45 MHz. band would require frequency measurement to an accuracy of  $\pm 1.0\%$  to ensure that emissions were within band, whereas operation within, say, 10 kHz. of band edge would require measurement to an accuracy of  $\pm 0.05\%$ . When determining the proximity of an emission to band-edge, the bandspread due to modulation, on the appropriate side of the carrier, needs to be added to the frequency tolerance of the carrier.

(b) **Heterodyne wavemeters and crystal calibrators.** When used in conjunction with a general coverage receiver, a 100 kHz. crystal is usually adequate for checking frequencies up to 4 MHz. For higher frequencies the spacing between 100 kHz. marker points is too small for accuracy, and a crystal of 500 kHz, or preferably 1 MHz. should be used in addition. If the receiver covers only the Amateur frequency bands the bandspread scale will usually allow a 100 kHz. crystal to be used with sufficient accuracy throughout the h.f. bands.

(c) **Absorption wavemeters and similar devices.** The scale length and accuracy should be suitable for measurements of the required accuracy to be made, and the frequency coverage must extend up to the second, and preferably the third, harmonic of the radiated frequency so that the presence of unwanted frequencies may be detected. For v.h.f. and u.h.f. transmitters, probably the best technique is to measure the frequency of the fundamental oscillator as accurately as possible and to use an absorption device to confirm that the wanted harmonic has been selected. When a v.h.f. or u.h.f. converter is used in conjunction with an h.f. receiver and the calibration of the main receiver can be checked with sufficient accuracy, this will provide a means of frequency measurement but it is also advisable to use an absorption wavemeter to check the measurement and to confirm that no unwanted radiations are present.