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STATUTORY INSTRUMENTS

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**2002 No. 798**

**CIVIL AVIATION**

**The Air Navigation (Environmental Standards) Order 2002**

*Made - - - - 26th March 2002*

*Coming into force in accordance with article 1*

At the Court at Buckingham Palace, the 26th day of March 2002

Present,

The Queen's Most Excellent Majesty in Council

Whereas a draft of this Order has been laid before and approved by a resolution of each House of Parliament, in accordance with section 102(3) of the Civil Aviation Act 1982<sup>(1)</sup>:

Now, therefore Her Majesty, in exercise of the powers conferred upon Her by sections 60(1), (2) (a) and (b), (3)(q)(r), 61(1), 101(1)(a) and 102(1) and (2) of the said Act and of all other powers enabling Her in that behalf, is pleased, by and with the advice of Her Privy Council, to order, and it is hereby ordered, as follows:

**PART I**

*Preliminary*

**Citation and commencement**

1. This Order may be cited as the Air Navigation (Environmental Standards) Order 2002 and shall come into force on the tenth day after the date on which it is made.

**Revocation**

2. The Orders specified in Schedule 1 are hereby revoked.

**Interpretation**

3.—(1) In this Order—

“adversely” means, for the purpose of the definition of “derived version” an increase by more than 0.3dB to any one of the noise certification levels;

“aircraft type certificate” means a certificate indicating that the type of aircraft to which the certificate refers is acceptable for airworthiness certification;

“authorised person” means any constable and any person authorised by the CAA (whether by name or by class or description) either generally or in relation to a particular case or class of cases;

“derived version” means an aircraft which, from the point of view of airworthiness, is similar to the aircraft in respect of which a noise type certificate has been granted but incorporates changes in type design which may affect its noise characteristics adversely;

“jet aeroplane” means an aeroplane powered by turbo jet engines or turbo fan engines;

“Mierolight aeroplane” means an aeroplane designed to carry not more than two persons which has:

- (a) a maximum total weight authorised not exceeding:
  - (i) 300 kg for a single seat landplane (or 390 kg for a single seat landplane in respect of which a United Kingdom permit to fly or certificate of airworthiness was in force prior to 1st January 2003),
  - (ii) 450 kg for a two seat landplane,
  - (iii) 330 kg for a single seat amphibian or floatplane, or
  - (iv) 495 kg for a two seat amphibian or floatplane; and
- (b) either a wing loading at the maximum total weight authorised not exceeding 25 kg per square metre or a stalling speed at the maximum total weight authorised not exceeding 35 knots calibrated airspeed;

“noise certificate” means a certificate issued by the CAA in accordance with article 5 or a certificate or other document issued or validated in accordance with article 4;

“noise type certificate” means a certificate indicating that the type of aircraft to which the certificate refers is acceptable for noise certification;

“prescribed” means prescribed by regulations made by the Secretary of State under this Order;

“rated output” has the meaning specified in Part I, Chapter 1 of Volume II of Annex 16;

“smoke” means the carbonaceous materials in exhaust emissions which obscure the transmission of light;

“subsonic aeroplane” means an aeroplane which is incapable of sustaining level flight at a speed in excess of flight mach 1.0;

“supersonic aeroplane” means an aeroplane which is capable of sustaining level flight at a speed in excess of flight mach 1.0;

Volume I of Annex 16 means the third edition—July 1993 of Volume I of Annex 16 to the Chicago Convention as amended by Amendment 6 dated 4th November 1999<sup>(2)</sup>;

Volume II of Annex 16 means the second edition—July 1993 of Volume II of Annex 16 to the Chicago Convention as amended by Amendment 3 dated 20th March 1997, Amendment 4 dated 4th November 1999, Supplement dated 31st December 1994 and Amendment to Supplement dated 25th March 1999.

(2) Other expressions used in this Order and in the Air Navigation Order 2000<sup>(3)</sup> shall have the same meaning in this Order as they have in that Order.

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(2) This Annex was published by the International Civil Aviation Organisation.

(3) S.I.2000/1562, to which there are amendments not relevant to this Order.

## PART II

### *Noise Certification*

#### **Requirement for noise certificate**

4.—(1) This article shall apply to every aircraft of a description specified in column 1 of the Table in Schedule 2.

(2) An aircraft to which this article applies shall not land or take off in the United Kingdom unless:

(a) there is in force in respect of that aircraft a noise certificate:

(i) issued by the CAA in accordance with article 5; or

(ii) in the case of a microlight aeroplane:

(aa) issued or validated by the competent authority of the country in which the aircraft is registered, being an EEA State which applies standards which are substantially equivalent to those required for the issue of a noise certificate by the CAA; or

(bb) issued or validated by the competent authority of the country in which the aircraft is registered, being a country prescribed as one which applies standards which in the opinion of the Secretary of State are substantially equivalent to those required for the issue of a noise certificate by the CAA; or

(iii) (except in the case of a microlight aeroplane) issued or validated by the competent authority of the Contracting State in which the aircraft is registered in accordance with the Chicago Convention; and

(b) any conditions subject to which the certificate was issued or validated are complied with.

(3) The foregoing prohibition shall not apply to:

(a) an aircraft flying in accordance with the “A Conditions” or the “B Conditions” set forth in Part A of Schedule 3 to the Air Navigation Order 2000; or

(b) an aircraft landing or taking-off at a prescribed place.

#### **Issue of noise certificate by the Civil Aviation Authority and validity of noise certificate**

(a) 5. (1) (a) The CAA shall issue a noise certificate in respect of any aircraft registered in the United Kingdom described in Column 1 of the Table in Schedule 2 if it is satisfied that the aircraft complies with the applicable standards specified or referred to in Column 2 of that Table in relation to the noise made by the aircraft.

(b) For the purposes of sub-paragraph (a) the applicant for a certificate shall furnish such evidence and submit the aircraft to such flying trials and other tests as the CAA may require.

(2) Except in respect of a microlight aeroplane, the CAA shall issue every noise certificate subject to a condition as to the maximum total weights at which the aircraft may land or take-off and may issue such a certificate subject to such other conditions relating to standards as to noise as it thinks fit.

(3) Subject to paragraph (4) and article 16, a noise certificate issued under this article shall remain in force without limit of time.

(4) A noise certificate issued under this article shall cease to be valid for the purposes of article 4:

(a) if the aircraft or any part of it is modified in any way which affects the ability of the aircraft to comply with the noise standards required by this Order, except if such modification is

in a manner and with material of a type approved by the CAA for the purposes of this Part of this Order either generally or in relation to a class of aircraft or to a particular aircraft;

- (b) until the satisfactory completion of any inspection or test of the aircraft required by the CAA to be made for the purpose of ascertaining whether the aircraft continues to comply with the noise standards required by this Order.

(5) For the purposes of determining the noise standard applicable to an aircraft where the interval between:

- (a) the application for a type certificate and the first issue of a certificate of airworthiness for an aircraft of that type, or
- (b) the application for a change of type design and the first issue of a certificate of airworthiness for an aircraft of that type as modified,

exceeds 5 years, the date on which the application for a type certificate or a change of type design was made shall, unless the CAA in a particular case otherwise directs, be deemed to be 5 years before the date of the first issue of the certificate of airworthiness.

#### **Information to be included in flight manual**

- (a) (a) This article shall apply to any aircraft (other than a microlight aeroplane) first registered in the United Kingdom on or after 1st August 1986 in respect of which by virtue of this Order a noise certificate is required to be carried.
- (b) An aircraft to which this article applies shall not fly unless the flight manual in respect of that aircraft includes the information specified in Part II, Chapter 1 of Volume I of Annex 16.

#### **Exemptions in respect of Part II of this Order**

7. The CAA, after consultation with the Secretary of State, may exempt from any of the provisions of this Part of this Order any aircraft or persons or classes of aircraft or persons, either absolutely or subject to such conditions as it thinks fit.

## **PART III**

### *Emissions Certification*

#### **Fuel venting requirements**

8.—(1) This article shall apply to—

- (a) every jet aircraft in respect of which a certificate of airworthiness was first issued on or after 18th February 1982; and
- (b) every aircraft to which paragraph (1)(a) does not apply but which is powered by one or more than one turbojet engine or turbofan engine where the date of manufacture of any such engine was on or after 18th February 1982.

(2) Subject to article 12, an aircraft to which this article applies shall not land or take-off in the United Kingdom unless it individually or is of a type which has been certified in accordance with article 11 as complying with the requirements relating to fuel venting specified in paragraph (3) and it is fitted with the engines specified in the emissions certification issued under article 11.

(3) The requirements referred to in paragraph (2) are that the aircraft is individually or is of a type which, when fitted with the type of engine specified in the emissions certification designed and constructed to prevent the intentional discharge into the atmosphere of liquid fuel from the fuel

nozzle manifolds resulting from the process of engine shutdown following normal flight or ground operations.

### **Smoke emission requirements**

9.—(1) This article shall apply to—

- (a) every subsonic aeroplane powered by one or more than one turbojet engine or turbofan engine where the date of manufacture of any such engine was on or after 1st January 1983; and
- (b) every supersonic aeroplane powered by one or more than one turbojet engine or turbofan engine where the date of manufacture of any such engine was on or after 18th February 1982.

(2) Subject to article 12, an aeroplane to which this article applies shall not land or take-off in the United Kingdom unless every engine of the description contained in paragraph (1) which is fitted to the aeroplane is of a type which has been certified in accordance with article 11 as complying with requirements relating to smoke emission specified in paragraph (3).

(3) The requirements referred to in paragraph (2) are—

- (a) for turbojet engines or turbofan engines fitted to subsonic aeroplanes those specified in Part III, Chapter 2 of Volume II of Annex 16; and
- (b) for turbojet engines or turbofan engines fitted to supersonic aeroplanes those specified in Part III, Chapter 3 of Volume II of Annex 16.

### **Unburned hydrocarbons, carbon monoxide and oxides of nitrogen emission requirements**

10.—(1) Subject to paragraph (4) this article shall apply to—

- (a) every turbojet engine and every turbofan engine intended for the propulsion of aeroplanes only at subsonic speeds the rated output of which is greater than 26.7 kilonewtons and the date of manufacture of which was on or after 1st January 1986;
- (b) every turbojet engine and every turbofan engine intended for the propulsion of aeroplanes at supersonic speeds, the date of manufacture of which was on or after 18th February 1982; and
- (c) every aeroplane which is powered by one or more than one turbojet engine or turbofan engine described in sub-paragraphs (a) or (b).

(2) Subject to paragraph (4) and article 12, an aeroplane to which this article applies shall not land or take-off in the United Kingdom unless every engine of the description contained in paragraph (1) (a) or paragraph (1)(b) which is fitted to the aeroplane is of a type which has been certified in accordance with article 11 as complying with the requirements specified in paragraph (3) relating to the emission of unburned hydrocarbons, carbon monoxide and oxides of nitrogen.

(3) The requirements referred to in paragraph (2) are—

- (a) for turbojet engines or turbofan engines intended for propulsion of aeroplanes only at subsonic speeds, the requirements specified in Part III, Chapter 2 of Volume II of Annex 16;
  - (b) for turbojet engines or turbofan engines intended for propulsion of aeroplanes at supersonic speeds, the requirements specified in Part III, Chapter 3 of Volume II of Annex 16.
- (a) (4) (a) The CAA may grant an exemption from the requirements referred to in paragraph (2) in respect of any engine manufactured after 31st December 1999 and in

respect of which the CAA is satisfied that not more than 50 engines of that type will be manufactured after that date;

- (b) An exemption granted in accordance with sub-paragraph (a) shall cease to be valid immediately upon a manufacturer producing more than 50 engines of the type in question after 31st December 1999.

### **Emissions certification**

**11.**—(1) Certification required by this Part of this Order shall be issued—

- (a) in the case of an aircraft registered in the United Kingdom by the CAA in accordance with paragraph (2); or
- (b) in the case of any other aircraft by the competent authority of a Contracting State in which the aircraft is registered in accordance with the Chicago Convention.

(2) The CAA shall certify a type of aircraft, turbojet engine, or turbofan engine if it is of the opinion that the type in question complies with the requirements specified in article 8(3), 9(3) or 10(3) as the case may be.

(3) The applicant for certification to be issued by the CAA pursuant to paragraph (1)(a) shall furnish such evidence and subject aircraft or engines of a type in respect of which the application has been made to such tests as the CAA may require.

### **Exceptions to requirement to be certified**

**12.** The requirement to be certified in accordance with this Part of this Order shall not apply to—

- (a) an aircraft flying in accordance with the “A Conditions” or the “B Conditions” set forth in Part A of Schedule 3 to the Air Navigation Order 2000; or
- (b) an aircraft landing or taking off at a prescribed place.

### **Exemptions in respect of Part III of this Order**

**13.** The CAA, after consultation with the Secretary of State, may exempt from any of the provisions of this Part of this Order any aircraft or engine or persons or classes of aircraft or engine or persons, either absolutely or subject to such conditions as it thinks fit.

## **PART IV**

### *Carriage, Production and Revocation of Noise Certificate*

#### **Noise certificate to be carried**

**14.**—(1) An aircraft shall not land or take-off in the United Kingdom unless it carries every noise certificate which it is required to carry under the law of the country in which it is registered other than any certificate which is required to be carried under regulation 18(1) or (2) of the Aeroplane Noise Regulations 1999(4).

- (a) (2) (a) Subject to sub-paragraph (b), an aircraft registered in the United Kingdom shall, when in flight, carry every noise certificate which is required by this Order to be in force in respect of that aircraft.

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(4) S.I. 1999/1452 as amended by S.I. 1999/2253.

- (b) If the flight is intended to begin and end at the same aerodrome in the United Kingdom, the certificate may be kept at that aerodrome instead of being carried in the aircraft.

#### **Production of noise certificate**

**15.**—(1) Within a reasonable time after being requested to do so by the CAA or an authorised person, the commander of an aircraft shall cause to be produced to the CAA or that person every noise certificate in force in respect of that aircraft other than any certificate which may be required to be produced under regulation 18(3) of the Aeroplane Noise Regulations 1999.

(2) Within a reasonable time after being requested to do so by the CAA or an authorised person, the operator of an aircraft shall cause to be produced to the CAA or that person every noise certificate in force in respect of that aircraft other than any certificate which may be required to be produced under regulation 18(3) of the Aeroplane Noise Regulations 1999.

#### **Revocation, suspension and variation of noise certificate**

**16.**—(1) The CAA may, if it thinks fit, provisionally suspend any noise certificate, exemption or other document issued under this Order pending inquiry into or consideration of the case.

(2) The CAA may, after sufficient ground being shown to its satisfaction after due inquiry, revoke, suspend or vary any such certificate, exemption or other document.

(3) The holder or any person having the possession or custody of any noise certificate, exemption or other document which has been revoked, suspended or varied under this Order shall surrender it to the CAA within a reasonable time after being required to do so by it.

(4) The breach of any condition subject to which any noise certificate, exemption or other document has been issued under this Order shall render the document invalid during the continuance of the breach.

## **PART V**

### *Offences, Penalties and General*

#### **Offences in relation to noise certificates and emissions certification**

**17.**—(1) A person shall not with intent to deceive—

- (a) use any noise certificate issued under this Order which has been revoked or suspended, or to which he is not entitled; or
- (b) lend any such certificate to, or cause or permit it to be used by, any other person; or
- (c) make any false representation for the purpose of procuring for himself or any other person the issue, renewal or variation of any such certificate or of emissions certification issued in accordance with article 11 of this Order.

(2) A person shall not purport to issue any noise certificate or emissions certification under this Order unless he has been authorised to do so by the CAA.

#### **Power to prevent aircraft flying**

**18.**—(1) If it appears to the CAA or an authorised person that any aircraft is intended or likely to be flown in such circumstances that articles 4(2), 8(2), 9(2) or 10(2) would be contravened, the CAA or that authorised person may direct the operator or the commander of the aircraft that he is not to permit the aircraft to make the flight or any other flight of such description as may be specified in the direction, until the direction has been revoked by the CAA or by an authorised person, and,

if the aircraft is in the United Kingdom, the CAA or that authorised person may take such steps as are necessary to detain the aircraft.

(2) The operator or, as the case may be, the commander of an aircraft shall comply with any direction given to him pursuant to paragraph (1), unless he has reasonable excuse.

(3) For the purposes of paragraph (1), the CAA or any authorised person may enter upon and inspect any aircraft.

### **Right of access to aerodromes and other places**

**19.**—(1) Subject to paragraph (2), for the purpose of ascertaining whether the provisions of this Order are being complied with, the CAA and any authorised person shall have the right of access at all reasonable times to any aerodrome or any other place in the United Kingdom where an aeroplane has landed for the purpose of inspecting any aircraft or any document which it, or he, has power to demand under this Order, and for the purpose of detaining any aircraft under this Order.

(2) In relation to any Government aerodrome the CAA or the authorised person (as the case may be) shall obtain the permission of the person in charge of that aerodrome before exercising the right of access referred to in paragraph (1).

### **Obstruction of persons**

**20.** A person shall not intentionally obstruct or impede any person acting in the exercise of his powers or the performance of his duties under this Order.

### **Penalties**

**21.**—(1) If any provision of this Order is contravened in relation to an aircraft the operator of that aircraft and the commander thereof shall (without prejudice to the liability of any other person under this Order for that contravention) be deemed for the purposes of the following provisions of this article to have contravened that provision unless he proves that the contravention occurred without his consent or connivance and that he exercised all due diligence to prevent the contravention.

(2) If it is proved that an act or omission of any person which would otherwise have been a contravention by that person of a provision of this Order was due to any cause not avoidable by the exercise of reasonable care by that person, the act or omission shall be deemed not to be a contravention by that person of that provision.

(3) If any person contravenes any provisions of this Order, not being a provision referred to in paragraph (4), he shall be guilty of an offence and liable on summary conviction to a fine not exceeding level 3 on the standard scale.

(4) If any person contravenes articles 4(2), 8(2), 9(2), 10(2), 17, 18(2) or 20 he shall be guilty of an offence and liable on summary conviction to a fine not exceeding the statutory maximum.

### **Liability of persons other than principal offender**

**22.**—(1) Where an offence under this Order has been committed by a body corporate and is proved to have been committed with the consent or connivance of or to be attributable to any neglect on the part of any director, manager, secretary or other similar officer of the body corporate or any person who was purporting to act in any such capacity, he as well as the body corporate shall be guilty of that offence and be liable to be proceeded against and punished accordingly.

(2) Where the affairs of a body corporate are managed by its members, paragraph (1) shall apply in relation to the acts and defaults of a member in connection with his functions of management as if he were a director of the body corporate.



(3) Where a Scottish partnership is guilty of an offence under this Order or any regulations made thereunder and that offence is proved to have been committed with the consent or connivance of, or to be attributable to any neglect on the part of, a partner, he as well as the partnership shall be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

### **Application of the Order to the Crown and visiting forces**

**23.**—(1) Subject to the following provisions of this article, the provisions of this Order shall apply to, or in relation to, aircraft belonging to or exclusively employed in the service of Her Majesty, as they apply to or in relation to other aircraft and for the purposes of such application the Department or other authority for the time being responsible on behalf of Her Majesty for the management of the aircraft shall be deemed to be the operator of the aircraft.

(2) Nothing in this article shall render liable to any penalty any Department or other authority responsible on behalf of Her Majesty for the management of any aircraft.

(3) The naval, military and air force authorities and members of any visiting force and any international headquarters and the members thereof and property held or used for the purpose of such a force or headquarters shall be exempt from the provisions of this Order to the same extent as if that force or headquarters formed part of the forces of Her Majesty raised in the United Kingdom and for the time being serving there.

(4) Nothing in this Order shall apply to or in relation to any military aircraft.

### **Extra-territorial effect of the Order**

**24.**—(1) Except where the context otherwise requires, the provisions of this Order—

- (a) insofar as they apply (whether by express reference or otherwise) to aircraft registered in the United Kingdom, shall apply to such aircraft wherever they may be;
- (b) insofar as they apply as aforesaid to other aircraft shall apply to such aircraft when they are within the United Kingdom;
- (c) insofar as they prohibit, require or regulate (whether by express reference or otherwise) the doing of anything by the commander of any aircraft registered in the United Kingdom, shall apply to him wherever he may be; and
- (d) insofar as they prohibit, require or regulate as aforesaid the doing of anything in relation to any aircraft registered in the United Kingdom by other persons shall, where such persons are Commonwealth citizens, British protected persons or citizens of the Republic of Ireland, apply to them wherever they may be.

(2) Nothing in this article shall be construed as extending to make any person guilty of an offence in any case in which it is provided by section 3(1) of the British Nationality Act 1948<sup>(5)</sup> (which limits the criminal liability of citizens of certain countries) that that person shall not be guilty of an offence.

### **Acceptance of reports**

**25.** The CAA may, for the purposes of this Order, accept reports furnished to it by a person whom it may approve, either absolutely or subject to such conditions as it thinks fit, as qualified to furnish such reports.

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(5) 1948 c. 56.

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*A. K. Galloway*  
Clerk of the Privy Council

## SCHEDULE 1

Article 2

## ORDERS REVOKED

	<b>References</b>
The Air Navigation (Aircraft and Aircraft Engine Emissions) Order 1986	<a href="#">SI 1986/599</a>
The Air Navigation (Aeroplane and Aeroplane Engine Emission of Unburned Hydrocarbons) Order 1988	<a href="#">SI 1988/1994</a>
The Air Navigation (Noise Certification) Order 1990	<a href="#">SI 1990/1514</a>

## SCHEDULE 2

Articles 4 and 5

## TABLE

(1) Description of Aircraft	(2) Relevant Standards
<i>Supersonic aeroplanes</i>	
<p>(1) Subject to article 5(5) every supersonic aeroplane which in the opinion of the CAA—</p> <p>(a) conforms to a type in respect of which the competent authority received an application for a type certificate before 1st January 1975 and did not reject that application and in respect of which a certificate was first issued on or after 26th November 1981; or</p> <p>(b) conforms to a derived version of such a type being an aeroplane in respect of which the competent authority received an application for a change to the type design before 1st January 1975 and did not reject that application and in respect of which the certificate of airworthiness for the individual aeroplane was first issued on or after 26th November 1981.</p>	<p>The noise made by the aeroplane shall be no greater than that made by the first certificated aeroplane of the type when the noise level of the aeroplane is determined in accordance with Appendix 1 of Volume 1 of Annex 16 in the noise certification reference conditions set out therein.</p>
<i>Microlight aeroplanes</i>	
(2) Every microlight aeroplane.	The standards set out in Schedule 3.
<i>Helicopters</i>	
(3) Subject to article 5(5) every helicopter which does not fall within paragraph (4) and which in the opinion of the CAA—	

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(1) Description of Aircraft	(2) Relevant Standards
<p>(a) (a) conforms to a type in respect of which the competent authority received an application for a type certificate on or after 1st August 1986 and did not reject that application; or</p> <p>(b) conforms to a derived version of a helicopter, being a derived version in respect of which the competent authority received an application to change the type design on or after 1st August 1986 and did not reject that application.</p> <p>(4) Subject to article 5(5) every helicopter having a maximum certificated take-off mass not exceeding 2730kg and which in the opinion of the CAA—</p>	<p>Part II, Chapter 8 of Volume I of Annex 16.</p>
<p>(a) (a) conforms to a type first issued with a type certificate (whether in the United Kingdom or elsewhere) in respect of which the competent authority received an application for a type certificate on or after 1st July 1992 and did not reject that application; or</p> <p>(b) the change of type design was issued, where such a change may increase the helicopter's overflight noise level, on or after 1st July 1992.</p>	<p>Part II, Chapter 11 of Volume I of Annex 16.</p>

### SCHEDULE 3

Articles 4 and 5 and Schedule 2

#### MICROLIGHT NOISE STANDARDS

- (a) For microlight aeroplanes first registered in the United Kingdom or elsewhere before 1st April 1986 the maximum noise levels when determined in accordance with the noise evaluation method of the Appendix to this Schedule shall not exceed the following:
- Single seat microlight aeroplanes 80 L<sub>AE</sub> (dB(A))
  - Two seat microlight aeroplanes 84L<sub>AE</sub> (dB(A))
- (b) For microlight aeroplanes first registered in the United Kingdom or elsewhere on or after 1st April 1986 and before the date when this Order comes into force the maximum noise levels when determined in accordance with the noise evaluation method of the Appendix to this Schedule shall not exceed the following:
- Single seat microlight aeroplanes 76L<sub>AE</sub> (dB(A))
  - Two seat microlight aeroplanes 80L<sub>AE</sub> (dB(A))
- (c) For microlight aeroplanes first registered in the United Kingdom or elsewhere on or after the date this Order comes into force the maximum noise levels when determined in accordance

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with the noise evaluation method of the Appendix to this Schedule shall not exceed  $80L_{AE}$  (dB(A)).

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## APPENDIX TO SCHEDULE 3

### NOISE EVALUATION METHOD FOR NOISE CERTIFICATION OF MICROLIGHT AEROPLANES

#### INTRODUCTION

##### 1

1.1 This noise evaluation method includes:

- (a) noise certification test and measurement conditions;
- (b) computation of the noise evaluation measure,  $L_{AE}$ ;
- (c) reporting of data to the CAA and correction of measured data.

##### 2. TEST PROCEDURES

2.1 All flight test procedures used in demonstrating compliance with the noise certification requirements shall be consistent with the airworthiness certification basis of the aeroplane.

2.2 The tests shall be carried out under the following atmospheric conditions:

- (a) no precipitation;
- (b) ambient temperature not above 35°C and not below 2°C at 1.2m above ground;
- (c) relative humidity not higher than 95 per cent and not below 20 per cent at 1.2m above the ground;
- (d) on a diagram of relative humidity plotted against temperature, combinations of relative humidity and temperature which fall below a straight line between (60 per cent, 2°C) and (20 per cent, 35°C) are unacceptable;
- (e) reported wind speed, when measured at 1.2m above the ground, shall not exceed 19 km/hr (10 knots) and cross wind component shall not exceed 9 km/hr (5 knots). Flights shall be made in equal numbers with tail and head wind components;
- (f) no temperature inversion or anomalous weather conditions that would significantly affect the noise levels of the microlight aeroplane observed at the specified measurement position.

2.3.1 Subject to paragraph 2.3.2 the microlight aeroplane shall pass overhead the noise measurement position within  $\pm 10^\circ$  of the vertical at a height of 150+10 –70 m (490+33 –230 ft).

2.3.2 The CAA may, having regard to the poor definition, in some circumstances, of the noise field shape for microlight aeroplanes at 150m determine that the test be undertaken at a height of 100 +60 –20 m +197 –66 ft).

2.4 Overflights shall be performed at stabilised speed in the cruise configuration, except that where the speed at take-off power would exceed the maximum speed authorised in level flight, climbing flight is acceptable.

2.5 The maximum static propeller speed shall be measured using a device accurate to within  $\pm 1$  per cent.

2.6 When requested in advance by the CAA, tape recordings of the noise tests shall be provided. In such cases the instrumentation standards and procedures shall be those described in paragraph 4.

## **CALCULATION OF SOUND EXPOSURE LEVEL $L_{AE}$ FROM MEASURED NOISE DATA**

### **3**

#### **3.1 Definition**

**3.1.1** The sound exposure level LAE is defined as the level, in decibels, of the time integral of squared 'A'-weighted sound pressure ( $P_A$ ) over a given time period or event, with reference to the square of the standard reference sound pressure ( $P_o$ ) of 20 micropascals (P) and a reference duration of one second.

**3.1.2** This unit is defined by the expression:—

$$L_{AE} = 10 \log \frac{1}{T_o} \int_{t_1}^{t_2} \left( \frac{P_A(t)}{P_o} \right)^2 dt$$

Where  $T_o$  is the reference integration time of one second and  $(t_2 - t_1)$  is the integration time interval.

**3.1.3** The above integral can also be expressed as

$$L_{AE} = 10 \log \frac{1}{T_o} \int_{t_1}^{t_2} 10^{L_A(t)/10} dt$$

Where  $L_A(t)$  is the time varying 'A'-weighted sound level.

**3.1.4** The integration time  $(t_2 - t_1)$  in practice shall not be less than the time interval during which  $L_A(t)$  first rises to within 10dB(A) of its maximum value ( $L_{Amax}$ ) and last falls below 10 dB(A) of its maximum value.

**3.1.5** The LAE may be approximated by the following expression for LAX:—

$$L_{AE} = L_{Amax} + \Delta A$$

Where

$\Delta A$  is the duration allowance given by  $\Delta A = 10 \log \tau$  where  $\tau = (t_2 - t_1)/2$ .

## **MEASUREMENT SYSTEM**

### **4**

**4.1** The measurement system shall consist of equipment equivalent to the following:—

- (a) A microphone, amplifier and indicating instrument having frequency response characteristics compatible with the measurement and analysis system accuracy required by paragraph 4.2.
- (b) Tripods or similar microphone mountings that minimise interference with the sound being measured.
- (c)
  - (i) Recording and reproducing equipment (when used) having frequency response and dynamic range characteristics compatible with the measurement and analysis system accuracy required by paragraph 4.2.
  - (ii) The CAA may require that the sound produced by the microlight aeroplane shall be recorded in such a way that complete information, including time history, is retained.
- (d) Acoustic calibrators using sine wave or broadband noise of known sound pressure level. If broadband noise is used, the signal shall be described in terms of its average and maximum root-mean-square (rms) value for non-overload signal level.
- (e) A graphic level recorder or tape recorder may be used to record the noise time history.

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#### 4.2 Sensing, Recording and Reproducing Equipment for Aeroplanes:—

- (a) (a) The sound level produced by the aeroplane shall be recorded. A magnetic tape recorder, graphic level recorder or sound level meter is acceptable at the option of the CAA.
- (b) When a tape recorder is used it shall form part of the complete system complying with International Electrotechnical Commission (IEC) Publication No. 1265(6) or an equivalent standard.

**4.2.2** The response of the complete system to a sensibly plane progressive sinusoidal wave of constant amplitude shall lie within the tolerance limits specified in Table IV and Table V for Type 1 instruments in IEC Publication No. 60651 or an equivalent standard for weighting curve 'A' over the frequency range 40 to 12 500 Hz.

- (a) (a) The recorded noise signal shall be read, over the frequency range 40 to 12 500 Hz through an 'A' weighting network as defined in IEC Publication No. 60651 or an equivalent standard with time weighting designated 'S' (SLOW)(7).
- (b) With the agreement of the CAA, during tests with high flight speeds, the 'F' (FAST) time weighting may be applied to obtain the true level.

**4.2.4** A windshield shall be employed with the microphone during all measurements of microlight aeroplane noise. Its characteristics shall be such that when it is used, the complete system, including the windshield will meet the specifications of paragraph 4.2.2. Its insertion loss at the frequency of the acoustic calibrator shall also be known and included in the provision of an acoustic reference level for the analysis of the measurements.

**4.2.5** The overall sensitivity of the measuring system shall be checked before and after the measurement of the noise level for a sequence of tests, using an acoustic calibrator generating a known sound pressure level at a known frequency. The output of the acoustic calibrator shall have been certified by a standardising laboratory(8) within 6 months of the test series; tolerable deviation in output from the manufacturer's stated level shall be not more than 0.2 dB.

### NOISE MEASUREMENT PROCEDURES FOR MICROLIGHT AEROPLANES

#### 5

**5.1** For demonstrating compliance with this Appendix the microphone shall be oriented in a known direction so that the maximum sound received arrives as nearly as possible in the direction for which the microphones are calibrated. The microphones shall be placed so that their sensing elements are approximately 1.2m (4ft) above the ground.

**5.2** Immediately prior to and after each test, a recorded acoustic calibration of the system shall be made in the field with an acoustic calibrator for the two purposes of checking system sensitivity and providing an acoustic reference level for the analysis of the sound level data.

**5.3** The ambient noise, including both acoustical background and electrical noise of the measurement systems, shall be recorded and determined in the test area with the system gain set

(6) International Electrotechnical Commission Publications are available at [www.iec.ch/](http://www.iec.ch/).

(7) F(FAST) time weighting refers to the simulated linear response of the sound level analysers to an actual change in Sound Pressure Level (SPL) readings.

The normal procedure, designated S(SLOW), takes four half second SPL readings and uses 13% from the initial half second interval, 21% from the second, 27% from the third and 39% from the fourth to calculate an equivalent SPL for a point in time at 1.25 seconds. This method is used in modern day analysis to simulate the performance of the old analogue analysers and maintain a constant data processing methodology.

The F(FAST) time weighting response uses the same procedure as S(SLOW) but is performed over a short duration and is equivalent to the performance of a digital analyser. This method is sometimes used in tests with high flight speeds in order to obtain a clearer and more accurate noise profile.

(8) A 'standardising laboratory' refers to a technical laboratory which has acoustic equipment calibrated against a 'gold' national standard and who is licensed to calibrate other external acoustic equipment against this 'gold' standard. This is a well known and documented technical term quoted in ICAO Annex 16 Volume 1 Appendix 2 Paragraph 3.5.5.



at levels which will be used for aeroplane noise measurements. If aeroplane sound pressure levels do not exceed the background sound pressure levels by at least 10dB(A), approved corrections for the contribution of background sound pressure level to the observed sound pressure level shall be applied.

## ADJUSTMENT OF FLIGHT TEST RESULTS

### 6

#### 6.1 General

**6.1.1** Differences between test conditions and reference conditions require that adjustments be made to the measured LAE figures for two different effects:—

- (a) variations in propeller tip Mach number and hence source noise;
- (b) variations in microlight aeroplane height over the noise measurement position and hence in noise path length.

#### 6.2 Adjustment for Propeller Tip Mach Number

An adjustment for propeller source noise  $\Delta m$  shall be added to the measured sound exposure level  $L_{AE\text{meas}}$

where

$$\Delta m = 85 \log((T - 0.0065H)/298),$$

T is the absolute temperature in degrees Kelvin at the height of the microphone on the test day, and H is the height in metres of the microlight aeroplane over the microphone.

For microlight aeroplanes described in paragraph (c) of Schedule 3, if the propeller tip Mach number measured statically is less than 0.7, the adjustment  $\Delta m$  is taken to be zero.

#### 6.3 Adjustment for Noise Path Difference

Noise measurements made for microlight aeroplane heights over the noise measurement position different from 150m (492 ft) shall be adjusted to 150m (492 ft) by adding a correction  $\Delta H1$  to the measured sound exposure level  $L_{AE}$

where

$$\Delta H1 = 14 \log(H/150)$$

where

H is the height in metres of the microlight aeroplane over the microphone.

#### 6.4 Reference day sound exposure level ( $L_{AE\text{ref}}$ ) is obtained from

$$\Delta m = 85 \log((T - 0.0065H)/298),$$

where

$L_{AE\text{meas}}$  is the measured value of LAE.

## NOISE EVALUATION MEASURE

### 7

**7.1** The noise evaluation measure shall be the sound exposure level  $L_{AE}$  as defined in this Appendix.

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## **NOISE CERTIFICATION REFERENCE PROCEDURES**

### **8**

**8.1** The reference procedure shall be calculated under the following atmospheric conditions:

- (a) sea level atmospheric pressure of 1013.25 hPa;
- (b) ambient temperature of 25°C at 1.2m above ground.

**8.2** The reference flight procedure shall comprise a series of level flights overhead the noise measurement position at a height of 150m (492 ft) and at maximum take-off power.

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## **EXPLANATORY NOTE**

*(This note is not part of the Order)*

**1.** This Order revokes and replaces the Air Navigation (Noise Certification) Order 1990, the Air Navigation (Aircraft and Aircraft Engine Emissions) Order 1986 and the Air Navigation (Aeroplane and Aeroplane Engine Emission of Unburned Hydrocarbons) Order 1988.

**2.** It consolidates existing UK legislation on noise certification for supersonic aeroplanes, microlight aeroplanes and helicopters and aircraft emissions certification (dealing with fuel venting and emissions of smoke, unburned hydrocarbons, carbon monoxide and oxides of nitrogen) into one document, harmonises certain applicability dates with those in Annex 16 to the Convention on International Civil Aviation 1944, implements in United Kingdom legislation the most recent provisions in Annex 16 relating to carbon monoxide (CO) and oxides of nitrogen (NO<sub>x</sub>) and introduces new standards for the noise certification of certain helicopters and microlight aeroplanes.

**3.** The Order continues:

- (i) to require all microlight aeroplanes and specified supersonic aeroplanes and helicopters taking off and landing in the United Kingdom to have a valid noise certificate (unless flying in accordance with certain conditions set out in Part A of Schedule 3 to the Air Navigation Order 2000 or taking off or landing in a prescribed place) (article 4).
- (ii) to define the circumstances under which a noise certificate can be issued and its period of validity (article 5).
- (iii) to provide for the CAA, after consultation with the Secretary of State to issue exemptions from the noise certification requirements (article 7).
- (iv) to require that specified aircraft shall not land or take off in the United Kingdom unless certified as complying with prescribed standards relating to fuel venting (article 8).
- (v) to require that specified aircraft shall not land or take off in the United Kingdom unless its engines are of a type which have been certified as complying with prescribed standards relating to smoke emissions and the emission of unburned hydrocarbons (articles 9 and 10).
- (vi) to except from the requirement to have emissions certification aircraft flying in accordance with certain conditions set out in Part A of Schedule 3 to the Air

- Navigation Order 2000 or aircraft taking off or landing in a prescribed place (article 12).
- (vii) to provide for the CAA after consultation with the Secretary of State to issue exemptions from the restrictions described in 3(iv) and 3(v) above and 4(v) below (article 13).
  - (viii) to require the noise certificate to be carried and produced when required and make failure to do so an offence (article 14).
  - (ix) to set out the offences in relation to noise certificates and emissions certification and the powers of the CAA relating to prevention (articles 17, 18 and 19).
    - (x) to set out the penalties for contravening the Order and the liabilities of offenders (articles 21 and 22).
    - (xi) to set out the applicability of the Order to the Crown and visiting forces (article 23).
    - (xii) to provide for the Order to have effect on aircraft registered in the United Kingdom wherever they are, on aircraft in the United Kingdom wherever they are registered, on the commanders of United Kingdom registered aircraft wherever they are and, in relation to any United Kingdom registered aircraft, any person being a Commonwealth citizen, a British protected person or a citizen of the Republic of Ireland wherever they are (article 24).

**4. The Order introduces new requirements as follows. The Order:**

- (i) prescribes new noise certification standards for specified helicopters being those contained in the July 1993 Edition of Volume I of Annex 16 to the Chicago Convention as amended by Amendment 6 dated 4th November 1999 (articles 4 and 5 and Schedule 2).
- (ii) prescribes new noise certification standards for microlight aeroplanes (articles 4 and 5 and Schedule 3), which are defined in Article 3.
- (iii) introduces the requirement that the flight manual of any aircraft first registered in the United Kingdom on or after 1st August 1986 (other than microlight aeroplanes) which require a noise certificate shall include the appropriate noise levels at the approved take off and landing weights (article 6).
- (iv) prescribes new standards in respect of smoke emissions and unburned hydrocarbons being those in Volume II of the July 1993 Edition of Annex 16 to the Chicago Convention as amended by Amendment 3 dated 20th March 1997, Amendment 4 dated 4th November 1999, Supplement dated 31st December 1994 and amendment to Supplement dated 25th March 1999 (articles 9 and 10).
- (v) introduces the requirement that specified aeroplanes shall not land or take off in the United Kingdom unless certified as complying with prescribed standards for emissions of carbon monoxide and oxides of nitrogen being those in Volume II of the July 1993 Edition of Annex 16 to the Chicago Convention as amended by Amendment 3 dated 20th March 1997, Amendment 4 dated 4 November 1999, Supplement dated 31st December 1994 and amendment to Supplement dated 25th March 1999 (article 10).
- (vi) introduces a power of exemption from the requirements relating to nitrogen oxide (article 10).
- (vii) provides for the acceptance by CAA of reports from approved persons (article 25).
- (viii) tabulates the types of aircraft to which Part II of the Order applies and the dates from which the relevant standards in Volume I of Annex 16 became applicable (Schedule 2).

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**5.** Copies of Annex 16 to the Convention on International Civil Aviation (Volume 1—Aircraft Noise, 3rd edition and Volume II—Aircraft Engine Emissions, 2nd edition, both published in July 1993 by the International Civil Aviation Organisation) may be obtained from documedia Limited, 37 Windsor Street, Cheltenham, Gloucestershire GL52 2DG.

**6.** A Regulatory Impact Assessment has been prepared and copies can be obtained from the Department of Transport, Local Government and the Regions, Aviation Environmental Division, Zone 2/27 Great Minster House, 76 Marsham Street, London SW1P 4DR (Tel: 020 7944 4876 and Fax: 020 7944 2192). Copies are to be placed in the Libraries of each House of Parliament.