

Operation of experimental aircraft under E Conditions

CAP 1220



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Acronyms

ANO	Air Navigation Order
ARC	Airworthiness Review Certificate
BCAR	British Civil Airworthiness Requirement
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CofA	Certificate of Airworthiness
CofG	Centre of Gravity
EASA	European Aviation Safety Agency
FAA	Federal Aviation Administration of the USA
MTOM	Maximum Take-off Mass
PPL	Private Pilot Licence
PtoF	Permit to Fly
RAeS	Royal Aeronautical Society
SI	International System of Units
SSDR	Single Seat De-regulated Microlight
STC	Supplemental Type Certificate
TC	Type Certificate

Definitions

Competent Person This is the person who is responsible for the entire experimental test programme, and who signs the Declaration. The Competent Person may also, but not necessarily be, the Registered Owner of the Aircraft, or the Principal Test Pilot, or both.

Competent Person Authorisation Letter This is the letter that an organisation, approved to authorise a Competent Person, will write to a person duly authorised, confirming them as Competent for the purposes of E Conditions. It will include a Competent Person Reference Number (CPRN).

Competent Person Reference Number (CPRN) This is a reference number that will be allocated to a Competent Person for the purposes of E Conditions.

Declaration This is the document submitted to the CAA, signed by the Competent Person, which specifies prescribed information about the flight test programme in accordance with this CAP and will declare that the Competent Person has undertaken a risk assessment and is satisfied that all risks have been mitigated to an acceptable level.

Supplementary Declaration This must be submitted to the CAA following the expiration of the previous Declaration should the trial need to continue.

Dossier The collection of documents containing information about the aircraft design and build, details of the flight test programme, a risk assessment and the Declaration.

E Conditions means the Conditions under which a United Kingdom registered aircraft may fly when it does not have a CofA or a PtoF as set out in the Experimental Aircraft General Exemption published under [Official Record Series 4 \(ORS4\)](#).

Experimenting Team This is the team of people who undertake the project to design, build and undertake the flight test programme of the experimental aircraft, in every case all under the authority of the Competent Person. The Experimenting team can be a team of one, i.e. the Competent Person, but it is considered this would not normally be the case.

Letter of Acknowledgement This is the letter that the CAA will write to the Competent Person to acknowledge receipt of the signed Declaration, to confirm that it has been placed on file by the CAA, and confirming that the aircraft has been entered on the UK Aircraft Register as an Experimental Aircraft operating under E Conditions.

Non-EASA experimental aircraft This means an aircraft which comes within paragraph (b) of Annex II of the Basic EASA Regulation¹.

Principal Test Pilot This is the test pilot nominated by the Competent Person and detailed in the Declaration as a principal member of the experimenting team.

RAeS Competent Person Request and Notification Form This is the form that a Member or Fellow of the Royal Aeronautical Society, who is also a Chartered Engineer registered with the Engineering Council via the Society, gives notification that they intend to act as a Competent Person.

¹ Paragraph (b) states: aircraft specifically designed or modified for research, experimental or scientific purposes, and likely to be produced in very limited numbers.

Introduction

This CAP provides guidance and information for those wishing to operate an Experimental Aircraft under E Conditions.

The UK Government is committed to reducing the burden of regulation, particularly where this is seen as disadvantageous to UK industry. The CAA is also committed, via the Government's Principles of Better Regulation, to establishing a proportionate safety regulatory framework coupled with a strategy of deregulating and delegating wherever possible. It is with regard to these strategic objectives that the CAA has formed a collaboration with the Royal Aeronautical Society to jointly develop the criteria and guidance contained herein to allow operation of experimental aircraft in a way previously not available in the UK.

The Royal Aeronautical Society, supported by the CAA, had also noted that there has been a trend towards an increase in the number of new modern light aircraft types, particularly kits, imported from overseas, while there has been a decrease in the number of new aircraft designed and developed in the UK. It was felt that the regulatory framework for developing and experimentally operating new light aircraft in the UK was contributing to this trend in that it was considered overly burdensome and was stifling innovation. This opinion was also supported by the comments the Government received in its Red Tape Challenge initiative aimed at General Aviation, conducted in 2013.

E Conditions

Operating an aircraft under E Conditions is a means to fly an experimental prototype or modified aircraft in order to test a concept in the air without having to obtain a PtoF, a CofA, comply with B Conditions or comply with the normal procedures contained in CAP553 BCAR Section A, Chapters A8-1, A8-9 and A8-21 for CAA approved Design and Production Organisations.

The fundamental principle of an operation under E Conditions is that a Declaration is filed with the CAA by someone who has met the requirements for an E Conditions competent person and who will take sole responsibility for the safe conduct of the entire experimental test programme. The aircraft must be registered with the CAA and it will be required to have third party insurance cover in accordance with Regulation (EC) No 785/2004. The Declaration, signed by the Competent Person, will include summary information such as start and finish dates and a brief description of the project. Most importantly, it will declare that the Competent Person has undertaken a risk assessment and is satisfied that all risks have been mitigated in accordance with Chapter 8 of this Guidance Material.

The means by which a person may become a Competent Person for the purposes of E Conditions is described in Chapter 6.

In addition to the Declaration, the Competent Person must compile a Dossier of information about the aircraft and the proposed test programme. The Dossier will contain information about the aircraft design and build, details of the flight test programme, a risk assessment and the Declaration. The Competent Person will be the custodian of this Dossier and the CAA will have rights of access to the Dossier if requested. However, the CAA will require receipt of the E Conditions Declaration, signed by a Competent Person, prior to the commencement of flight of an experimental aircraft under E Conditions.

The E Conditions provision should not be confused with the US 'Experimental Category' of operation which is commonly used for indefinite operations, typically of homebuilt aircraft which in the UK would be required to hold a National PtoF. By contrast, the new E Conditions described in this CAP are intended to allow innovative experimental flight testing of a new idea or design within a clearly defined time period.

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CHAPTER 1

Regulatory context to E Conditions

A National PtoF can be issued by the CAA if the aircraft concerned is outside the scope of responsibility of EASA as specified in Regulation (EC) No 216/2008 (the EASA Basic Regulation) and specifically in Annex II which includes in paragraph (b) "aircraft specifically designed or modified for research, experimental or scientific purposes, and likely to be produced in very limited numbers."²

However, PtoF are issued to permit the operation of aircraft that do not meet the requirements of the International Civil Aviation Organisation (ICAO) Annex 8 – 'Airworthiness of Aircraft' but are nevertheless established to be airworthy and capable of safe operations under defined operating conditions and for defined purposes. Consequently, the CAA will only issue a PtoF once it is satisfied that the aircraft is fit to fly having regard to the airworthiness of the aircraft.

Existing regulations also provide for A and B Conditions. A Conditions are applicable to enable an aircraft of a design which has previously been approved to fly to qualify for the issue of a CofA. B Conditions are applicable to enable experimenting with or testing an aircraft, or to enable the aircraft to qualify for the issue or validation of a CofA or PtoF, or the approval of a modification of an aircraft. However, flying under B Conditions can only be carried out by an organisation specifically approved for the management and control of flights under B Conditions. The resources required and cost of obtaining such an approval are considered by many to be prohibitive and the reason for the decline in new light aircraft designed and developed in the UK. Further information on A and B Conditions can be found in CAP 553: BCAR Section A.

For the duration of the E Conditions operation, any previously held EASA or National CofA or National PtoF is suspended.

When the test flight programme is completed, the owner or Competent Person should contact—

- EASA for guidance on reinstating an EASA CofA or PtoF; or
- CAA for guidance on reinstating a national CofA or PtoF.

However, please note it may not always be possible to reinstate a pre-existing CofA or PtoF following operation under E Conditions. Furthermore, the CAA will not be obliged to accept any EASA aircraft into the Annex II fleet following completion of the trial.

Guidance on the use of EASA aircraft for E Conditions operations can be found in Chapter 2.

² <https://easa.europa.eu/document-library/regulations/regulation-ec-no-2162008>

CHAPTER 2

Scope of E Conditions

E Conditions enables the flight testing of a UK Registered Experimental Aircraft which is designed to be flown by a flight crew of at least one pilot and has an MTOM of 2000kg or less, when overseen by a person considered as competent for the task. The MTOM of 2000kg is consistent with the ELA2 MTOM as defined in Article 1(j) of Commission Regulation (EC) No 748/2012³

Note: Single Seat De-regulated microlights (SSDR) can continue to operate under the SSDR rules⁴ without the need for E Conditions.

The requirement for experimental testing may be because the aircraft, engine(s), propellers/rotors are of new design, or because they have been modified. In addition, E Conditions can be used if the aircraft is being operated in a manner or role that is previously unproven.

Both commercially-built and amateur-built non-EASA aircraft are eligible for E Conditions operation.

It is up to the Competent Person to judge whether or not the Experimental Aircraft comes within the terms of reference of the E Conditions rules as described in this CAP.

An EASA aircraft may be modified so that it becomes a non-EASA Annex II experimental aircraft. It will then be able to fly under E Conditions. The owner or Competent Person should notify EASA in such a case.

As noted in Chapter 1, to operate under E Conditions, any CofA or PtoF for the aircraft must be suspended.

³ Laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations

⁴ [IN-2014/101](#)

CHAPTER 3

General guidelines

The following general guidelines establish the working basis for the oversight of Experimental Aircraft operating under E Conditions.

An aircraft operating under E Conditions is not required to have a CofA, PtoF, type certificate, type approval or type acceptance. Any CofA or PtoF that is held in respect of the aircraft will be suspended on submission of the E Conditions Declaration.

The Competent Person will take sole responsibility for the safe conduct of the entire experimental test programme.

The Competent Person must compile an E Conditions Dossier consisting of four separate parts:

- Part A of the E Conditions Dossier is the Declaration. The Declaration provides summary information on the flight test programme and confirms that all identified safety risks have been assessed. Suggested risk assessment methods can be found in this CAP. The Declaration must be signed by the Competent Person and is the only part of the Dossier submitted to the CAA.
- Part B of the E Conditions Dossier comprises the details of the aircraft.
- Part C of the E Conditions Dossier comprises the details of the flight test programme and specific conditions and limitations relating to the operation of the aircraft.
- Part D of the E Conditions Dossier comprises the risk assessment. This is an assessment of the safety risks to ensure that adequate consideration and mitigation is given to all the risks and what measures have been taken to minimise them to a level as outlined later in this guidance material.

The Declaration, signed by the Competent Person, should be accompanied by a copy of either the Competent Person Authorisation Letter or the Competent Person Request and Notification Form (as applicable) and the appropriate fee. A Letter of Acknowledgement from the CAA will serve as confirmation of the CAA's receipt of the valid Declaration. The aircraft must not fly until the written acknowledgement has been received.

A Letter of Acknowledgement does not attest to the airworthiness of the aircraft on the CAA's part. It merely advises that the CAA recognises that the aircraft will be flying under E Conditions with risks managed by the Competent Person. The CAA will not attest to the airworthiness of the aircraft and will place full reliance on the Declaration by the Competent Person.

Operation under E Conditions for an indefinite period is not intended. The period of time for operation under E Conditions must be specified on the Declaration but cannot exceed twelve months. The period of time can be extended by submitting a Supplementary Declaration. However, the CAA may refuse to issue a Letter of Acknowledgement for an E Conditions Declaration or Supplementary Declaration which in its reasonable opinion is repetitive. In that case, the aircraft must not fly under E Conditions. The circumstances of each Declaration will be taken into account when making this decision; in particular the number of previous Declarations submitted and the perceived complexity of the modifications or design in question.

An aircraft operating under E Conditions can only fly for the purposes prescribed within the E Conditions.

Passengers or cargo cannot be carried during E Conditions operation.

Commercial operations, including hire and reward, cannot be performed under E Conditions.

A to B (ferry) flights are not permitted under E Conditions.

The Competent Person must have the agreement of the Registered Owner(s), individual or Company as identified on G-INFO in order to conduct the experimental programme using the aircraft.

Useful guidance on amateur-built aircraft can be found in [CAP 659](#) (A Guide to Approval, Construction and Operation of Amateur Built Aircraft).

If a radio is to be installed or used on the aircraft, a Radio Licence must be obtained. Further information on radio licensing can be found on the [CAA website](#).

At the end of an E Conditions flight test programme, a prototype may be eligible for certification if the aircraft is subsequently shown to comply with the applicable airworthiness standards for the category sought and compliance has been demonstrated throughout the aircraft's construction period.

CHAPTER 4

Prescribed purpose of flight

Aircraft operating under E Conditions can only be flown for the purposes set out below.

The Competent Person must ensure that the risk assessment required under E Conditions includes consideration of all flights undertaken for any of the following purposes. This risk assessment must take into account the risk to third parties. Further guidance on risk assessments can be found later in this CAP.

Experimenting with or Testing the Aircraft

This purpose is intended for experimental flight including proof-of-concept flying, or for operations such as determining whether an idea warrants further investigation. Examples of this activity include testing new aircraft design concepts, new engine or propeller or aircraft equipment installations, revised aircraft weight or weight distribution, new aircraft operating techniques or new uses for aircraft.

The amount of flight testing required to complete the test programme will depend on the type and complexity of the project. For example, flight testing in connection with a modification may require only one hour, whilst the flight testing of a prototype aircraft may require significantly more.

Note: Whilst the primary purpose of E Conditions is to conduct experimental test flights, if it is determined that the project has potential for future certification, it may be possible that credit can be given for data acquired from these flights. Careful recording of data, precise aircraft configuration control, and accurate documentation of results will help facilitate this.

Demonstration of the aircraft

Demonstration flights may only be carried out following experimental or test flying. Some examples of this purpose include demonstrating the aircraft's flight capabilities, performance, or unusual characteristics, or any engines or equipment installed on the aircraft.

Flight under E Conditions is not to be used for public exhibition.

Operations under this purpose are limited to an area, specified by the Competent Person, in the vicinity of the venue of the intended demonstration.

Before E Conditions operation for this purpose, the Competent Person should have established a maintenance program for the continued airworthiness of the aircraft, and the aircraft should have flown successfully for at least 20 hours, or at least 5 hours if it is a type certificated, type approved or type accepted aircraft which has been modified. In

some cases this may not be adequate to provide a reasonable safety case, and thus the hours required will exceed the figures given above.

Prohibited purpose: A to B flights (ferry flying)

Ferry flying is excluded under E Conditions. Should it prove necessary to ferry the aircraft from A to B then an application for a flight for this purpose must be made to the CAA for an Exemption in the normal way.

The reason for an application for an exemption may be that the aircraft may need to be taken to a place at which any experiment, inspection, repair, modification, maintenance, approval, test or weighing of the aircraft, the installation of equipment in the aircraft or demonstration is to take place for a purpose referred to above. An exemption may be granted only when no other practical alternative exists, because of the potential for additional third party risk. Such flights should be kept as short as possible whilst maintaining the lowest possible risk profile.

For an exemption to be considered the Competent Person must have established a maintenance program for the continued airworthiness of the aircraft, and have had the aircraft flown for at least 20 hours, or at least 5 hours if it is a type certificated, type approved or type accepted aircraft which has been modified. In some cases this may not be adequate to provide a reasonable safety case, and thus the hours required will exceed the figures given above.

No flying under an exemption should exceed operational limits (flight envelope) established during the test programme to date.

A risk assessment must specifically address the risks raised by the planned route including pilot workload, mixing with other air traffic, terrain, etc.

CHAPTER 5

Registration and marking

To qualify for flight testing under E Conditions the aircraft must be 'G' registered.

In addition to the nationality and aircraft registration marks, as required by ANO and CAP 523, The words "UK EXPERIMENTAL" must be displayed on the aircraft near each entrance to the cabin or cockpit in letters not less than 5 cm or more than 15 cm in height. The letters should be in block capitals of a style that is conspicuous and legible, and easily read by each person entering the aircraft.

A placard must be displayed within sight of all occupants of the aircraft to read "This UK registered Experimental Aircraft has not been approved and may only be flown by permission granted under ANO E Conditions."

If a ballistic recovery system is fitted, suitable indication of its position should be provided.

In order to register the aircraft, [Form CA1](#) must be completed. The aircraft's experimental status will be recorded in the registration database G-INFO (<http://www.caa.co.uk/ginfo>)