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Approval of Design Changes

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Approval of Design Changes

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GENERAL

Jersey Aviation Circulars are issued to provide advice, guidance and information on standards, practices, and procedures necessary to support Jersey Aviation Requirements. They are not in themselves law but may amplify a provision of the Air Navigation (Jersey) Order or provide practical guidance on meeting a requirement contained in the Jersey Aviation Requirements.

PURPOSE

This Circular provides guidance, to applicants for the preparation of the data required to support applications for the approval of design changes (modifications) to aircraft in compliance with the Air Navigation (Jersey) Law 2014 and JAR Part 21.

RELATED REQUIREMENTS

This Circular relates to JAR Part 21 and, insofar as a design change may affect noise certification, JAR Part 36.

CHANGE INFORMATION

First issue.

ENQUIRIES

Enquiries regarding the content of this Circular should be addressed to the DCA at the address on the DCA website cidca.aero or

<https://www.gov.je/Travel/MaritimeAviation/CivilAviation/pages/officedirector.aspx>

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1 Introduction

Design changes cannot be incorporated into an aircraft registered in a Territory unless the change is approved in compliance with the Air Navigation (Jersey) Law 2014 and JAR Part 21 Subpart C. This JAC provides guidance to the applicant on the processes required to achieve the acceptance and approval of the design change on a Territory-registered aircraft.

2 Terminology

- 2.1 Some regulatory bodies describe changes to an aircraft design as 'modifications'; other regulatory bodies use the term 'alteration' to describe an aircraft design change.
- 2.2 The JARs and this JAC use the term 'design change': i.e. there are aircraft Type Designs and there are changes to the Type Design, hence 'Design Changes'.

3 Classification of changes

- 3.1 Generally there are two classifications of design change: Minor and Major. The JARs accept the Minor/Major classifications used by the applicable NAA specified in JAR Part 21.25(a) for the design change. There is therefore no classification in the JARs. This avoids any confusion that may arise with potentially different classifications between the JARs and the applicable NAA.
- 3.2 Applicants should discuss the classification of design changes with their Director of Civil Aviation. The Director of Civil Aviation is responsible for the agreeing the classification of the design change and hence the method of acceptance of the design change.

Note: Since the principle of acceptance and approval of a design change by a Director of Civil Aviation is essentially the same for a minor or major classification, a common approval process is acceptable.

4 Certification basis

The design change process generally involves acceptance and approval of the change against the Type Design certification standards identified in the Type Acceptance Certificate. The acceptable certification standards are outlined in JAR Part 21.25(a).

5 Principles of acceptance

- 5.1 Director of Civil Aviation does not have the engineering capability to carry out a technical assessment of the details of design changes or to verify the compliance with aircraft certification design standards to directly approve data. Reliance is therefore placed on the acceptance of data approved directly or indirectly by a State of Design NAA as listed in JAR 21.25.

5.2 Examples of acceptable design changes are:

- (a) An EASA / FAA STC to be embodied on an aircraft where the Type Acceptance Certificate basis is the applicable EASA / FAA Type Certificate.
- (b) An FAA STC to be embodied on an aircraft where the Type Acceptance Certificate basis is an EASA Type Certificate where there is acceptable justification from a suitably approved authority or organisation that the certification basis is equivalent.
- (c) An EASA STC to be embodied on an aircraft where the Type Acceptance Certificate basis is an FAA Type Certificate where there is acceptable justification from a suitably approved authority or organisation that the certification basis is equivalent.
- (d) An EASA minor design change, which is either approved directly by EASA or approved by a suitably approved EASA Part 21J DOA, to be embodied on an aircraft where the Type Acceptance Certificate basis is the applicable EASA Type Certificate.
- (e) An FAA or Transport Canada Alteration or EASA standard design change (Minor) that is embodied on an aircraft to data containing acceptable methods, techniques and practices for carrying out and identifying such changes, including the associated instructions for continuing airworthiness and that are not in conflict with TC holder's data. Standard Changes and Alterations are changes to a type-certificate only in relation to aeroplanes of 5700 kg Maximum Take-Off Mass (MTOM) or less, rotorcraft of 3175 kg MTOM or less that follow design data included in specifications issued by the relevant Agency e.g. FAA AC 43.13-1B, 43.13-2B and EASA CS-STAN. See Appendix 2 for guidelines.
- (f) An FAA Form 8110-3, approved by a FAA Designated Engineering Representative with a Statement of Compliance to Airworthiness Standards. Note: FAA Designees may need FAA approval to approve data for non-N Registered aircraft.
- (g) Design changes that are accepted through an agreed Bi-Lateral Agreement and the associated Technical Implementation Procedures (TIP) or any applicable Working Arrangement between the relevant aircraft State of Design and an approving authority as listed in JAR 21.25.
- (h) For minor design changes only, it is possible to accept the processes of an NAA as specified in JAR Part 21.25(a) that is not the NAA of the Type Acceptance Certificate basis. Note: This approach may require the subsequent recertification of the design change, during any export process to another State.

5.3 Operational Data and Certification

- (a) The design change acceptance process requires that the Director be supplied with the details of any associated instructions for continued airworthiness and any changes required to the Flight Manual. Updates to the applicable Aircraft Maintenance Programme and Operational Manuals must therefore also be submitted to the Director of Civil Aviation for approval or acceptance as appropriate.

- (b) Any alterations to the aircraft weight and balance must be supported by a weight and balance schedule of change report. It may be necessary to reweigh the aircraft to determine the actual change.
- (c) Updates to all other aircraft manuals must also be identified following the introduction of the design change. E.g. AMM, IPC, Wiring Manual etc.
- (d) Where JAR Part 36 requirements are altered, the applicable Type Acceptance Certificate or Noise Certificate will require to be updated.

6 Approval process

- 6.1 The Air Navigation (Jersey) Law 2014 Part 3 Article 8 states 'an aircraft C of A ceases to be in force if any part of the aircraft is modified otherwise than in a manner approved by the Governor'. JAR Part 21 also requires all design changes to be approved by the applicant's Director of Civil Aviation.
- 6.2 Two approaches are possible, direct approval by the Director of Civil Aviation or indirect approval via a process and associated Company JAR 39 MCM procedure approved by the Director of Civil Aviation. The approach to be taken by an applicant will be determined by the applicable Director of Civil Aviation.
- 6.3 **Direct Approval:** each Director of Civil Aviation will have its own application forms for use by applicants. Each applicant for approval of a design change must supply the basic information related to the design change and all other applicable information associated with the change, as outlined in the above paragraphs. The Director of Civil Aviation will review the acceptance criteria and the associated information and if acceptable will issue an approval of the design change and ensure that any manuals or certificates are updated, as necessary. The method of recording the approval of the design changes will be determined by the applicable Director of Civil Aviation.
- 6.4 **Indirect Approval:** operators of large aircraft typically have established relationships with suitably approved design organisations who are able, through their Organisation privileges, to approve minor design changes and design and obtain regulatory approval of major design changes. Compliance with the Air Navigation (Jersey) Law 2014 and JAR Part 21 design change approval requirements can therefore utilise the processes employed by the design organisation. The JAR Part 39 approved organisation responsible for the continued airworthiness management of the aircraft should document the design change approval process in a procedure in the Operators Maintenance Control Manual (MCM). The Director of Civil Aviation approval of the MCM which includes the design change approval procedure therefore means that the design change will be approved by the Director of Civil Aviation, indirectly.
- 6.5 The design change details, operational data and effects on any certification must be notified, by the continued airworthiness organisation, to their applicable Director of Civil Aviation. A declaration form should be used for this purpose. Appendix 1 gives a possible example of a optional declaration form and what information should be included.
- 6.6 If in accordance with JAR 21.73(a)(2) a design change has been certified in accordance with a certification standard that is not the issuing state of Type Certification, as listed in the Type Acceptance Certificate, against which the C of A for the aircraft has been issued, an additional statement by a suitably approved design organisation shall be given to confirm that the design change is compliant

with the TAC certification standards insofar as they are affected by the design change.

- 6.7 The method of recording the approval of the design changes will be determined by the applicable Director of Civil Aviation.

Appendix 1 Example Design Change Declaration Form (Optional)

<h1>DECLARATION OF THE CERTIFICATION OF A DESIGN CHANGE OR REPAIR</h1>		
<p>The purpose of this document is to provide the records and the declaration of the acceptability of an aircraft design change certification in compliance with JARs for a Jersey registered aircraft.</p>		
<h3>DESIGN CHANGE/REPAIR TITLE</h3> <p>Description of the design change or repair</p>		
Revisions:	Issue:	Date:
<h2>DECLARATION</h2>		
AIRCRAFT TYPE DESIGNATION:		
SERIAL NUMBER:		
REGISTRATION:		
DESIGN CHANGE REFERENCE/ENGINEERING ORDER/STC:		
APPLICABLE TC/TAC:		
APPROVAL REFERENCE/BASIS OF APPROVAL:		
APPLICABLE NAA: FAA, TCCA or EASA		
AIRCRAFT APPLICABILITY:		
FLIGHT MANUAL REFERENCE:		
ORGANISATION SUBMITTING THE DECLARATION:		
RELATED ORGANISATION APPROVAL NUMBERS:		
1	Associated Flight Manual Supplement Reference, if applicable:	
2	Detail the effect on Environmental Standards, if applicable:	

3	<p>Confirm any changes to Technical Manuals have been appropriately embodied: e.g. Weight and Balance: AMM: SRM: ELA: AMP:</p>	
4	<p>Effect on Operation Approvals:</p>	
5	<p>Detail the effect on Continued Airworthiness Instructions, if applicable:</p>	
6a	<p>General Certification Statement</p>	<p>The Design Change outlined in this report has been certified in accordance with the applicable certification standards listed in the Type Acceptance Certification and all applicable aircraft document changes have been updated. The design change is compatible with the aircraft configuration.</p> <p>..... Date: For and on behalf of the Organisation</p>
6b	<p>Design Compatibility Declaration (If applicable)</p>	<p>In accordance with 21.73 (a) (2) the Design Change outlined in this report has been certified in accordance with the applicable certification standards of the FAA, TCCA or EASA that is not the issuing state of Type Certification, as listed in the Type Acceptance Certificate, against which the C of A for the aircraft has been issued and is compliant with the TAC certification standards in so far as they are affected by the design change.</p> <p>..... Date: For and on behalf of the Organisation (Installer)</p>
7	<p>Approval:</p> <p>Date of Issue: OF CIVIL AVIATION</p> <p>..... For and on behalf of <i>DIRECTOR</i></p>	

Appendix 2: Guidance for applicants who do not hold Design Organisation Approvals, for the preparation of the data required to support applications for the approval of minor design changes and repairs to aircraft.

1 Introduction

- 1.1 Standard Design Changes, Alterations or Repairs are changes to a type-certificate in relation only to aeroplanes of 5700 kg Maximum Take-Off Mass (MTOM) or less, rotorcraft of 3175 kg MTOM or less that follow design data included in specifications issued by the relevant Agency e.g. FAA AC 43.13-1, 43.13-2 and EASA CS-STAN. Such Standard Changes or Alterations are to be submitted to the appropriate Director of Civil Aviation in accordance with JAR 21 Subpart C or Subpart M and this appendix guidance.
- 1.2 Where FAA, Transport Canada Civil Aviation or EASA standard design change regulations permit, subject to Director of Civil Aviation agreement, minor design changes and repairs may be embodied on an aircraft, to approved or accepted generic data containing acceptable methods, techniques and practices for carrying out and identifying such a change or repair, by a Certified Mechanic under a JAR Part 145 Approval.
- 1.3 The data should include the associated instructions for continuing airworthiness and must not conflict with TC or STC holder's data. Such a design change to an aircraft, should be classified as 'minor' in accordance with the appropriate NAA's instructions, i.e. it should not affect Mass, Balance, Structural strength, Reliability, Operational Characteristics or Environment (noise, emissions, fuel venting) etc.
- 1.4 The data submitted in support of an application for the approval of a minor change to acceptable data needs to convey the following information:
 - A definition of the change – what it is doing and on what aircraft,
 - Details of how the change is embodied (accomplishment instructions),
 - Details of how the changed aircraft is maintained (Instructions for Continued Airworthiness – or ICA),
 - Details of how the change complies with the applicable airworthiness and operational or airspace requirements.
- 1.5 There is no pre-defined format for the presentation of much of the information detailed in 1.3 (above), however the guidance in the following paragraphs should be taken into consideration when preparing the data pack for Director of Civil Aviation acceptance. It is typical that a single 'change document' would contain the definition and accomplishment information, with the ICA and the airworthiness compliance details as separate sections, documents or attachments.

2 Definition of the minor change

- 2.1 The minor change must be clearly defined, addressing the following aspects:
 - Unique identification (modification number),
 - A concise title,
 - A description of the change, and
 - Aircraft type and model applicability
- 2.2 The Director of Civil Aviation approval note for a design change / repair will refer to a specific set of data. The applicant must therefore assign and identify each individual document associated with the change with:
 - A unique document number,
 - A revision or issue status, and
 - The date of the issue or revision of the source data.

It is useful if all documents and drawings associated with a change are listed within a single document (typically incorporated within the 'change document'), so that it may become the definition reference for the change – similar in concept to a Master Data List.

- 2.3 The change should be given a title that concisely describes the scope and purpose of the change. Generic titles such as 'Avionics Upgrade' should be avoided and more specific titles such as 'Installation of Bloggs ELS123 Transponder to Comply with Elementary Mode S' should be used. This title should be reflected on the application form.
- 2.4 The change document should include a brief, but complete, introductory description of the proposed change, including:
 - Details of what is being installed and where,
 - Details of what is being removed,
 - Details of interfaces to existing aircraft systems/equipment, and
 - Details regarding the purpose of the change (for example 'to comply with Elementary Mode S requirements' or 'to qualify the navigation equipment for BRNAV operation in accordance with...').
- 2.5 The aircraft to which the change is applicable must be fully detailed. This includes the aircraft type, any applicable model(s) of that type and the respective Type Certificate Data Sheet. For example:
Aircraft Type: Piper PA-24
Applicable Models: PA-24-250, PA-24-260 and PA-24-400
TCDS: FAA TCDS 1A15 Revision 34
- 2.6 It is usually permissible for a minor change to be applicable to more than one aircraft model if the applicable models are covered by the same aircraft type TCDS and it can be shown that the change is compatible with that model – for example, where other models of the type have a similar instrument panel.
- 2.7 If there is any other limitation to the applicability, for example 'VFR Aircraft Only', then this must also be stated.

3 Change detail – Guidance for development of advisory information and accomplishment instructions

- 3.1 The change document must fully describe the means by which the change can be consistently embodied and provide any necessary supplementary advisory information. The change document text may be supplemented by drawings or references to aircraft or equipment manufacturer's documentation as necessary. The accomplishment instructions will include, but not be limited to, details of:
 - Verification that the existing aircraft configuration is compatible with the proposed design changes before embodiment begins,
 - Access or preparation work,
 - Special precautions,
 - Required tooling, test equipment or aircraft/equipment manufacturer's data,
 - Parts to be manufactured,
 - Parts or equipment to be fitted (by part number) including location and the associated methods of attachment/installation,
 - Required materials,
 - Modification to existing aircraft parts or structure,
 - Required placards,
 - Any necessary wiring. The wiring diagrams will include:
 - Wire type and size,
 - Wire, connector, earth point, switch etc identification,

- Screening and shielding information,
 - Circuit breaker types and rating,
 - Wire routing/installation information (i.e. standard practices),
 - Any required testing, including that necessary to:
 - To confirm compliance with airworthiness or operational requirements (typically only done on first of type installations, but may be necessary on subsequent installations for certain elements such as electrical load which will have to consider individual aircraft configurations),
 - To confirm correct installation (e.g. wiring continuity/insulation/bonding or pressure/leak testing),
 - To confirm proper function of installed equipment and any interfacing systems to ensure that disturbed systems have been properly restored and are not adversely affected by the change (including EMC interference checks).
- 3.2 Flight-testing is not normally necessary for the certification of a minor change. If it does become necessary, the change may be re-classified Major, requiring a different application process.
- 3.3 The change document should provide full details of the effect the change has on the aircraft's weight and balance and the electrical load – showing that neither the existing C of G range or the generator/busbar ratings are exceeded.
- 3.4 If the change introduces anything that is subject to an Airworthiness Directive (AD), then that effect should be highlighted. For example, if a transponder installation is interfaced with an altitude encoder providing Gillham-coded data then the change should inform the installer/operator that the modified aircraft would be subject to EASA AD 2006-0265.
- 3.5 If the change includes optional content it should be 'parted' such that the embodiment of certain parts of the change can be properly and separately recorded. An example of acceptable parting would be to provide options for a Nav/Com to interface with different or optional indicators, displays or audio systems – where the Nav/Com provides the common element to the change.
- 3.6 If the change introduces separate and un-related features - such as the introduction of a transponder, an ELT and a DME - the minor change should be composed as a single (un-parted) minor change or be split into separate minor changes covered by separate approval applications. It should be noted that if the cumulative effect of the new features is 'appreciable' then the change might be re-classified as Major.

4 Instructions for continued airworthiness

- 4.1 The change data pack must provide information on how the continued airworthiness of the changed aircraft is assured. This data is commonly referred to as the Instructions for Continued Airworthiness (ICA).
- 4.2 The ICA will include the following elements:
- Instructions on the removal and installation of equipment which may fail or otherwise need replacement during service (including subsequent testing – which may not necessarily be the same test as that required during embodiment of the change),
 - Any instructions necessary for access,
 - Instructions on and frequency of any required scheduled maintenance,
 - Instructions on and parts required for any servicing (charging, lubrication etc),
 - Details of any tooling or test equipment,

- Details of any supplementary data such as equipment or aircraft manufacturers instruction manuals,
- Details of any Airworthiness Limitations.

- 4.3 This data should comply with the relevant airworthiness requirements (e.g. CS xx.1529 and the associated appendix). The instructions should be provided in the form of a manual or a supplement to an existing manual, be arranged in a practical manner and address each topic of CS xx.1529 (as applicable).
- 4.4 It is not sufficient to only refer to the specific existing aircraft maintenance programme for the scheduled maintenance aspects of continued airworthiness. The scheduled maintenance requirements must always be explicitly noted. Where such maintenance is covered by an existing maintenance programme entry, a note may be included in the ICA stating which task(s) of that programme cover the scheduled maintenance requirements introduced by the change.

5 Operational instructions (including Flight Manual Supplements)

A change to the Flight Manual or Supplements is not normally necessary for the certification of a minor change. If it does become necessary, the change may be re-classified Major, requiring a different application process.

6 Recording compliance with applicable airworthiness and/or operational requirements

- 6.1 Applicants are required to demonstrate how the design change complies with all the applicable airworthiness (certification basis) and/or operational requirements plus any associated means of compliance material.
- 6.2 The certification basis applied is usually that specified in the Type Certificate Data Sheet (TCDS) or Supplemental Type Certificate (STC) for the aircraft type. However, the applicant may elect to comply with later requirements for that class of aircraft (e.g. FAR 23) for the affected areas. The amendment status of the Certification Specifications used should be stated.
- 6.3 The applicable airworthiness requirements for the affected areas (i.e. those impacted by the design change) should be identified from the certification basis and the corresponding details of how compliance has been demonstrated should be recorded. These statements of compliance should directly address the respective requirements. This can be recorded in a simple matrix.
- 6.4 Compliance with the applicable parts of the published guidance material or advisory material (e.g. FAA Advisory Circular AC 43.13 or EASA CS-STAN) material should also be recorded.
- 6.5 Only persons entitled to release to service an aircraft after maintenance in accordance with JAR Part 43 or Part 145 are considered as an eligible installer responsible for the embodiment of a minor design change when in compliance with the applicable requirements.
- 6.6 Parts and appliances to be installed as part of a minor design change. The design of the parts and appliances to be used is considered a part of the change/repair, and therefore, there is no need of a specific design approval. Normally, a minor design change shall not contain specifically designed parts that should otherwise be produced by a production organisation approved in accordance with a Production Organisation Approval (POA). In the case that the change or repair would contain

such a part, it should be produced by an approved Production Organisation and delivered with an appropriate authorised release form. Eligibility for installation of parts and appliances belonging to a minor design change is subject to compliance with JAR Part 21 and Part 39 and Part 145 related provisions, and the situation varies depending on the aircraft in / on which the change is to be embodied, and who the installer is. Furthermore, the Organisations scope of JAR Part 145 approval may contain provisions allowing certain parts to be fabricated and installed in / on the aircraft as part of their maintenance activities.

- 6.7 Parts and appliances identification. The parts modified or installed during the embodiment of the minor design change should be permanently marked in accordance with JAR Part 21 Subpart Q.
- 6.8 Record-keeping. The person responsible (see paragraph 6.4 above) for the embodiment of the change / repair should keep the records generated with the minor design change as required by JAR Parts 21, 39 and 145. In addition, JAR 39 requires that the aircraft owner or continuing airworthiness manager keeps the status of the changes / repairs embodied in / on the aircraft, to control the aircraft configuration and manage its continuing airworthiness.
- 6.9 Regarding minor design changes, the information provided to the owner or continuing airworthiness manager should include, as required, a copy of any modified aircraft manual and / or instructions for continuing airworthiness. All this information should normally be consulted when the aircraft undergoes a certificate of airworthiness or permit to fly review, and therefore, a clear system to record the embodiment of design changes, which is also easily traceable, would be of help during subsequent aircraft inspections.
- 6.10 Maintenance Programme and instructions for continuing airworthiness, the aircraft owner or continuing airworthiness manager needs to assess if the changes in the ICA of the aircraft requires the amendment of the aircraft maintenance programme and if it does, to obtain its approval in accordance with JAR Part 39.