Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 21-11 v1.1

Amateur-built (ABAA) aircraft – certification

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Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Purpose

This Advisory Circular (AC) provides guidance and information for Civil Aviation Safety Authority (CASA) staff, authorised persons and applicants applying for a special category Certificate of Airworthiness (CoA) issued for an amateur-built aircraft in Australia, subsequent to the issue of the CASRs, and specifically CASR Part 21 Subpart H, "Certificates of Airworthiness". This AC also elaborates on the procedures for building, certificating and operating type-accepted amateur-built aircraft; explains how much fabrication and assembly the amateur builder must accomplish for the aircraft to be eligible for amateur-built certification; and the roles of persons authorised by CASA in the certification process.

For further information

For further information, contact CASA's Airworthiness and Engineering Branch (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Airworthiness and Engineering.

Note: Changes made in the current version are not annotated. The document should be read in full.

Version	Date	Details
v1.1	November 2022	Administrative review only.
(0)	September 2000	Initial AC.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
An amateur-built aircraft	an aircraft of which the major portion has been fabricated and assembled by a person or persons who undertook the construction project solely for their own education or recreation
aircraft evaluation	an evaluation performed for the purpose of determining if a specific amateur-built aircraft meets the major portion requirements as per above
amateur	one who follows a sport or pursuit for the personal satisfaction of it, not for financial reward
amateur builder	a person who constructs an aircraft under amateur-built aircraft guidelines, and who does not receive any form of payment for such an activity;
Amateur-Built Aircraft Acceptance (ABAA).	a process carried out jointly by CASA and the Sports Aircraft Association of Australia (SAAA), culminating in the issue of a type acceptance document by CASA
commercial assistance	assistance in the building of an amateur-built aircraft in exchange for compensation. This does not include one builder helping another
compensation	payment by the amateur builder in cash, services, or other tender, to any person who provides assistance on a commercial basis in the building of an aircraft
checklist	the Fabrication/Assembly Operation Checklist which can be used as an aid in determining if the manufacturer’s aircraft kit meets the major portion requirements as referred to above. It can also be used for determining if the completed aircraft is eligible for certification as an amateur-built aircraft
Kit	a collection of prefabricated components, parts and materials that constitute all or part of what is required to produce a finished aircraft, as sold by a manufacturer of that kit, whether or not the manufacturer actually fabricates some or all of the kit contents
kit evaluation	an evaluation to determine if an aircraft built from, and according to, the kit instructions will meet the major portion requirements referred to above
major portion	means that when the aircraft is completed, the majority of the fabrication and assembly tasks have been performed by the amateur builder(s) who submit or intend to submit (in the case of partially completed kits) the application for certification. The major portion means more than 50% of the aircraft
plans built aircraft	an aircraft that is constructed exclusively from plans/blueprints without the aid of purchased major sub-assemblies or pre-assembled kit components. This also includes aircraft of a builder’s original design (as opposed to aircraft built from a kit)

Term	Definition
unacceptable commercial assistance	any commercial assistance that reduces the work performed by the amateur builder to less than the major portion of the aircraft construction. **Note 1:** An aircraft built from a kit need not necessarily be a “kit built aircraft”. **Note 2:** For further information as to the permitted commercial assistance refer to AC 21.29 “Commercial Assistance During Construction of Amateur Built Experimental Aircraft and Amateur-built (ABAA) Aircraft”. This document contains the fabrication/assembly operation checklist

1.2 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Civil Aviation Safety Regulations (CASRs) Part 21 Subpart H	
Civil Aviation Regulation (CAR 1988) 262AP	
CAO 101.28.	

2 Background

2.1.1 Standard certificates of airworthiness are issued to individual Australian aircraft which meet the requirements of an applicable comprehensive airworthiness code as required by Part II, Section 2.2 of the International Civil Aviation Organisation (ICAO) Annex 8, "Airworthiness of Aircraft", and have been issued with a Type Certificate. A CoA is required for each aircraft engaged in international operations.

2.1.2 Any aircraft which does not have a standard CoA cannot be operated unless it has been issued a special CoA (including an experimental certificate) or a special flight permit.

2.1.3 CASR 21.191 provides for the issue of experimental certificates for the operation of amateur-built and kit built aircraft. However, the CASRs Part 21 also allows an amateur builder to undertake a project involving a type with the relevant CASA acceptance, referred to as an Amateur-Built Aircraft Acceptance (ABAA), under the cognisance of a CASA recognised organisation. A list of CASA recognised organisations appears at Annex 1. CASR 21.190 provides for the issue of special CoAs in the amateur-built category (as aircraft accepted under an ABAA). This AC covers this particular facet of amateur aircraft building. Amateur-built experimental aircraft are described in full in a companion AC 21.4, "Amateur-Built Experimental Aircraft – Certification".

2.1.4 Over the last few decades, the Australian amateur-built aircraft certification system was regulated through two key CAOs; CAO 100.18, "Airworthiness Administration and Procedures – Amateur-Built Category Aircraft" and CAO 101.28, "Airworthiness Certification Requirements – Amateur-Built Category Aeroplanes". With the introduction of the CASRs, CAO 101.18 has been repealed. However, the overall regulatory policies of the ABAA process of amateur building remain basically the same.

3 Aircraft eligibility

3.1.1 The following general guidelines establish the working base for the oversight of an amateur- built aircraft:

a. an ABAA for the aircraft type has been issued by CASA (or its predecessor organisations) before 1 October 1998, or has been issued in response to an application submitted to CASA before 1 October 2000. The SAAA has been recognised by CASA as a recognised organisation to accept applications for ABAAs. All new applications for ABAAs should be made initially to the SAAA;
b. the major portion of the aircraft i.e. more than 50 % is fabricated and assembled by a person or persons who undertake the construction project solely for their own education or recreation;
c. maximum take-off weight (MTOW) is no greater than 1500 kilograms;
d. no more than four seats are fitted;
e. if the aircraft is an aeroplane for which acceptable data regarding the aeroplane's stalling speed is available — the stalling speed VSO at MTOW must not exceed 61 knots where the aeroplane is fitted with a Type Certificated engine (or engines), or 55 knots in any other case;
f. if the aircraft is an aeroplane that is fitted with one, or more than one, Type Certificated engine(s) and for which acceptable data regarding the aeroplane's stalling speed is not available – the maximum wing loading must not exceed:
    i. 65 kilograms per square metre with a flap area of less than 6% gross wing area; or
    ii. 80 kilograms per square metre with a flap area of at least 6% gross wing area;
g. if the aircraft is an aeroplane that is fitted with one, or more than one, non- type certificated engine(s) and for which acceptable data regarding the aeroplane's stalling speed is not available – the maximum wing loading must not exceed:
    i. 55 kilograms per square metre with a flap area of less than 6% gross wing area; or
    ii. 65 kilograms per square metre with a flap area of at least 6% gross wing area;
h. the aircraft must comply with the design requirements and documentation contained in sections 3 (Design Standards) of CAO 101.28;
i. approval for the manufacture of the aircraft was given by an authorised person or CASA, and the aircraft was manufactured in accordance with that approval;
j. the aircraft must have been subjected to pre-closure structural stage inspections, and a final inspection, during manufacture, as per the project inspection schedule;
k. aircraft which are manufactured or assembled, or imported, as a business for sale to other persons, are not considered to be bona fide amateur-built aircraft, regardless of the status of the builder;
l. the aircraft must be registered, and marked in accordance with Australian registration requirements, unless it is eligible for and complies with a recognised

organisation registration requirements, with the owner wishing to take the recognised organisation route;

m. the aircraft cannot be commercially operated. However, flight training will be permitted under certain circumstances i.e. type endorsement training and training undertaken by the owner.

4 Type acceptance

4.1 Background

4.1.1 Amateur builders have four choices in selection of an amateur-built aircraft type design for their project, as follows:

a. an experimental aircraft (refer AC 21.10, “Experimental Certificates”);
b. an established design, supported in Australia by the existence of a full ABAA;
c. a design which is supported by a provisional ABAA (awaiting final approval by CASA).
d. a First-of-Type (FOT) aircraft or First-of-Model (FOM) aircraft design, which will involve the builder being the applicant for issue, by CASA, of an ABAA.

4.1.2 An ABAA is a formal document, signed by a CASA delegate, which can be considered to be a low level Type Certificate together with its accompanying Type Certificate Data Sheet (TCDS).

4.1.3 The ABAA contains the approved data pertaining to a particular design. The document forms the basis for construction of all subsequent aircraft of that type and model in Australia. CASA’s Aircraft Certification Section will continue to maintain a master list of all ABAAs that have been issued including individual ABAA serial numbers, issue numbers and effective dates.

4.1.4 An ABAA can only be issued once all flight testing of the aircraft has been completed. This includes all handing qualities and other flight aspects of the aircraft type having been shown to be acceptable as well as the FOT/FOM aircraft flight assessments made by the test pilot. It is emphasised that the ABAA process is undertaken jointly by the applicant, CASA and a recognised organisation, unless the applicant does not wish a recognised organisation to be involved.

4.1.5 Under CASR 21.190, aircraft with existing ABAAs will be able to be produced indefinitely. Applications for new aircraft utilising the ABAA process will only be able to be made up until 30 September 2000. New applications for ABAAs will not be accepted after this date. Note that new applications accepted prior to 30 September 2000 will not have to be processed and completed by this date.

4.1.6 CASA requires the structural integrity of a new amateur-built design, for which an ABAA can be issued, to be shown in one of four ways:

a. a basic structural justification; or
b. a safe history of operation; or
c. a combination of the above; or
d. evidence that the equivalent of a certificate of type approval has been issued by a Contracting State to ICAO.

4.1.7 Coordination will be arranged and advice given by a recognised organisation. However, note that sub-section 4 (2) (iii) of CAO 101.28 would negate the need for the above, if a Contracting State of ICAO has issued a Type Certificate or equivalent document on the

type involved. Each individual case will involve separate discussion and negotiations with CASA.

4.1.8 Those builders who choose not to undertake an existing ABAA project route should follow procedures laid down in paragraphs 4.2 to 4.9 below.

4.2 Applying for a new ABAA

4.2.1 Any person is eligible to make an application for issue of an ABAA, but this has to be done by 30 September 2000.

4.3 Where to apply

4.3.1 Applicants are strongly encouraged to commence the ABAA application process through a recognised organisation in preference to CASA.

4.3.2 Applicants for an ABAA who wish to deal with CASA are advised that CASA's first priority is to fare paying passengers, and that processing of an ABAA application will only receive a low priority. However, in the event that the applicant chooses to involve CASA in the ABAA process, the request should be addressed to the applicant's nearest CASA District Office. A list of CASA District Offices and contact details appears in AC

4.4 When to apply

The ABAA issue application process should be commenced as soon as an applicant decides he or she will take this design selection option. Note that there may be circumstances that are not apparent to the applicant that could preclude the eventual issue of an ABAA. The applicant is encouraged to contact a recognised organisation early on in the process in order to minimise the potential for any time or financial implications that may arise.

4.5 Application procedure

4.5.1 Application procedures for ABAAs may vary between recognised organisations. Advice on ABAA applications should be sought from directly from these organisations. There is no CASA form associated with the application for an ABAA.

4.5.2 Coordination of submissions for new ABAAs will be arranged and advice given by a recognised organisation. Each individual case will involve separate discussion and negotiations with CASA.

4.6 Documentation requirements

4.6.1 Documentation required to support the issue of an ABAA is as follows (also refer CAO 101.28):

a. a complete set of construction drawings; these may form part of the kit construction manual in the case of an aircraft constructed from a kit.

The drawings should include a general aircraft arrangement showing leading dimensions, rigging details, control surface movements and adequate identification and location of important sub-assembly data. General arrangement, sub-assembly and detail drawings should clearly define the designer's intention in terms of dimensions, tolerances, material specification, standard parts and finish. Building instructions, where provided, should be sufficient to amplify and clarify the designer's intentions. Additional design drawings may be required by an authorised person or CASA where the designer's intentions have not been clearly specified;

b. a maintenance manual, if one exists for the type;
c. a flight manual, if one exists for the type;
d. supporting designer newsletters, Service Bulletins or equivalent documents, and any Airworthiness Directives (ADs) issued by cognisant aviation regulatory authorities;
e. if a structural justification is being provided (subparagraph 4.1.6 (a) above), then this should include:
    i. an applied loads analysis report;
    ii. a stress analysis of all primary structural components; or
    iii. a report of static load tests, if applicable;
f. if a safe history of operation is the basis of design substantiation (subparagraph 4.1.6 (b) above), then the service histories of a number of examples of the type operating overseas must be provided. The histories should show that at least six examples have flown at least 100 hours without major problems having occurred. However, CASA reserves the right to vary this requirement i.e. fewer safe histories than six may be acceptable if each example aircraft involved has more than a minimum of 100 hours; and
g. a signed technical statement by the aircraft type designer or an equivalent document, which includes leading particulars; weight and Centre-of-Gravity (CG) limits; operational flight limits; the recommended engine/propeller combination(s), and range of engine powers permitted; the basic standard to which the aircraft has been designed; the dates of original design and first flight; the number of aircraft of the type flying; and any accident history.

4.6.2 During the documentation review, additional information and drawings may be called for, such that the integrity of the aircraft type design can be assessed. The applicant is obliged to provide this information on request.

4.7 Payment of fees

4.7.1 The recognised organisation will have a scale of fees to cover the activities it carries out. These fees do not take into account any CASA schedule of fees that may be applicable.

4.7.2 Section 97 of the Civil Aviation Act 1988 allows prescribed fees to be payable to CASA in advance of work to be done.

4.7.3 In the case of work carried out by CASA, leading to the issue of an ABAA, an hourly fee in accordance with the CASA schedule of fees is charged. The estimate, payment and reconciliation procedure is as follows;

a. CASA Central Office will prepare an estimate based on experience, and the specific tasks to be undertaken. The estimate is based on worktime estimates for the staff involved, and all associated travel costs as applicable;
b. the applicant pays the estimate fee;
c. actual manhours expended are recorded on timesheets as the task is undertaken. The assessment of the ABAA data package will involve structures, systems and powerplant specialists staff; and
d. a reconciliation will be made prior to the issue of the ABAA. If the initial CASA estimate fee was overestimated, a refund of the difference will be paid to the applicant. If the initial estimate fee was underestimated, a final additional payment will be required from the applicant prior to the issue of the ABAA.

4.7.4 An applicant may engage a consultant to work in conjunction with CASA on a type assessment project. Any fees involved are a matter between the applicant and the consultant.

4.8 Issue of the provisional ABAA

4.8.1 The recognised organisations will be responsible for issuing provisional ABAAs from 1 October 1998.

4.8.2 Nothing prevents the applicant commencing the aircraft construction during the assessment phase leading up to provisional ABAA issue. However, applicants should note that the Letter of Authorisation required for the build commencement will contain the warning note:

Note: Until the design data for the aircraft is accepted by CASA, manufacture is entirely at the builder's own risk without any assurances that the type will ever gain acceptance as an amateur-built (ABAA) aircraft.

4.8.3 Subparagraph 4.1.1 (c), states that an amateur builder can select a design which may be supported by a provisional ABAA. The recognised organisation is expected to monitor the rate of construction of subsequent aircraft of the type involved, and advise CASA if any project is moving ahead of the nominated aircraft. A potential concern is that if a design deficiency is discovered in the FOT aircraft which requires incorporation of a modification, then the most advanced aircraft may have progressed beyond the stage of easy incorporation of such necessary modification.

4.8.4 An assessment may be made by the person coordinating ABAA production to nominate another project as the FOT aircraft.

4.9 Issue of the full ABAA

4.9.1 The FOT/FOM aircraft is to carry out the necessary flight testing under cover of an experimental certificate, in order to show that the type or model meets the flight

performance and handling requirements of CAO 101.28. This involves more comprehensive flight testing than would be the case for a non-FOT/FOM aircraft.

4.9.2 Such flight testing should be carried out in accordance with the requirements and procedures laid down in a CASA publication, “Flight Test Guide for Certification of CAO 101.28 Category Aeroplanes”. If aircraft other than aeroplanes are involved, then advice should be sought from the CASA Test Pilot for an appropriate procedure. Applicants for all classes of FOT/FOM aircraft should, in any case, contact the CASA Test Pilot at an early stage in the project, in order that this important phase of the overall certification process is properly planned. The recognised organisation can also provide advice in this area.

4.9.3 The minimum qualification a pilot must hold to carry out the initial flight testing on an amateur-built aircraft is a Private Pilot Licence (PPL) with the appropriate endorsements. Paragraph 5.79(2)(b) of the Civil Aviation Regulations 1988 (CAR 1988) allows a PPL holder to fly an aircraft without the appropriate endorsement for the purpose of “(i) testing the aeroplane; or (ii) carrying out an experiment in relation to the aeroplane” if CASA has given the holder permission in writing under subregulation 5.50(1) of CAR 1988 to fly the aeroplane in those circumstances. Similar provisions exist for the holders of PPLs in helicopter and gyroplane classes.

4.9.4 Although the regulations do not call for the FOT/FOM amateur-built aircraft test pilot to have any specific test flying qualifications or knowledge, it would be most unwise for the initial flight tests to be carried out by other than a pilot with such knowledge, especially in the case of a totally unproven design. Possible stability and control problems, of which the applicant may be unaware, might only become apparent after first flight lift-off.

4.9.5 After some or all of the flight test results are obtained, the CASA Test Pilot will carry out a limited flight test check program, to validate the findings of the flight test schedule and confirm that the flight characteristics of the type or model comply with the design requirements.

4.9.6 When flight test results have been reviewed jointly by the relevant technical specialists as appropriate, any deficiencies deemed critical will be identified and required to be addressed. The applicant must then ensure that fixes or modifications are embodied that remove the deficiencies. The CASA Central Office delegate (either a representative from a recognised organisation or a CASA representative) is then in a position to issue the full ABAA, which is a prerequisite for CoA issue for any aircraft of the type or model in this category.

4.9.7 Note that detail on the issue of the experimental certificate, test area allocation and flight restrictions etc. is contained in succeeding paragraphs of this AC. The same overall regulatory control principles apply to the flight testing of types for which a full ABAA is in force.

5 Approval to manufacture

5.1 Application

5.1.1 An ABAA aircraft amateur builder must obtain an approval to manufacture prior to commencing work on the ABAA project. Applications should be made to a recognised organisation.

5.1.2 The following are the minimum details which must be provided in the letter/form with attachments:

a. name and address of builder, or spokesperson of the group if applicable. If the latter, then names and addresses of all others in the group must be included;
a. skills, qualifications and experience of all the builders in the group must be stated;
b. type of aircraft involved, and the ABAA number if known;
c. the address at which the aircraft is to be built;
d. details of the workshop, its facilities, and tools to be used;
e. details of drawings and building instructions to be used for the project; and
f. an identification of the kit, kits parts and/or other prefabricated parts which will be incorporated in the project.

5.1.3 This form/letter application will facilitate the assessment of the above processes by the recognised organisation.

5.2 The test piece

5.2.1 A test piece may be required at the start of the project so that the recognised organisation (or CASA) can assess the capabilities and manufacturing skill of the builder(s) involved. Selection of the test piece is dependent on the primary form of aircraft design construction i.e. metal, composite or wood. The recognised organisation prescribes standard test pieces in this regard, and can supply the necessary drawings. The test piece can be inspected during the workshop inspection.

5.3 The workshop inspection

5.3.1 The applicant should arrange an inspection of the facilities through a recognised organisation.

5.4 Welding authority

5.4.1 Manual welding of amateur built components must be performed and certified by:

a. a person who is the holder of a valid CASA welding authority which covers the type of welding and material involved; or
b. an approved organisation with coverage for the type of welding and material involved; or

c. the amateur builder, provided that the builder holds a civil qualification to cover the type of welding and material involved and provided that the builder submits to CASA standard test pieces which are assessed as satisfactory to a CASA recognised assessor.

5.4.2 If welded components form part of a kit, then the amateur builder must ensure that the welding involved meets a standard in the country of origin that was acceptable to the relevant regulatory authority as applying to fully certificated aircraft (with documented evidence thereof). Otherwise, the designer or manufacturer must provide a document which identifies the source of the welding, and states that the designer's quality standards have been met.

5.4.3 If any doubts exist as to the requirements of (a) and/or (b) above being satisfied, then these should be raised with the recognised organisation/CASA Airworthiness Inspector during the workshop inspection phase.

6 Modifications

6.1.1 Any modifications to be incorporated in the ABAA aircraft must be assessed as to whether or not it will require engineering justification under regulation 35 of CAR 1988.

6.1.2 If a modification is not detailed in the designer's data and drawings, then it must be approved under regulation 35 of CAR 1988. This is usually carried out by a consulting aeronautical engineer, normally referred to as a "Reg 35 engineer". Given the CASA priorities stated at paragraph 4.3.2, applicants would normally have obtained the services of a Reg 35 engineer early in the project. Arrangements as to the production of the necessary drawings (either by the applicant or the Reg 35 engineer) for approval by the Reg 35 engineer, and costs involved, are matters for the applicant and Reg 35 engineer to decide. CAR 35 provisions will be replaced by provisions within CASR Parts 43 and 183 in the near future.

6.1.3 Note that the recognised organisation can advise applicants on the ramifications of any proposed modification to an ABAA design. However, no entity within the recognised organisation has the authority to process modifications unless authorised under regulation 35 of CAR 1988.

6.1.4 If a modification which an amateur builder wishes to embody in his or her aircraft has already been approved in Australia, then the approved drawings may be used to facilitate this, subject to applicable copyright requirements. The costs which may be associated with these are a matter for the builder to resolve with those making the drawings available.

6.1.5 If a modification has been used on a number of other aircraft of the same type or model, then the builder may justify modification integrity using the same safe history of operation principles as were described in sub-paragraph 4.6.1(f). The builder may collect these histories and have them passed to CASA through the same recognised organisation channels.

6.1.6 Finally, it should be noted that care must be taken to ensure that any one modification does not impact on the airworthiness integrity of any other modification.

7 The construction phase

7.1 General

7.1.1 An amateur builder constructing an aircraft under the ABAA system has far less latitude in the choice of components and materials used than a builder following the amateur-built experimental guidelines, as the aircraft is being constructed to particular drawings and designer's specifications.

7.1.2 Notwithstanding this, there may be options open for an ABAA aircraft amateur builder regarding alternative materials and processes. It is recommended that, in these circumstances, only approved components and established aircraft quality material be used. Use of non-approved materials, or those whose identity cannot be established, will require justification before use.

7.1.3 Many builders will, at the outset of their project, have little or no experience with respect to aeronautical standards, practices and workmanship. This is where initial advice from the recognised organisation sources referred to in previous sections of this AC will be invaluable.

7.1.4 Information and guidance concerning acceptable fabrication and assembly is provided in the publication "Construction of Amateur-built Aircraft in Australia" by Stephen Mitchell. In addition, U.S. Advisory Circulars, AC 43.13-1A," Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair", and AC 43.13-2A," Acceptable Methods, Techniques, and Practices — Aircraft Alterations" also provide useful information. The "Custom Built Sport Aircraft Handbook" published by the Experimental Aircraft Association (the EAA) in the USA also provides a guide to construction standards for amateur builders. These publications are available from Airservices Australia Publications Centre and from pilot supply outlets. The recognised organisation will also have a comprehensive listing of other publications, circulars and periodicals on amateur aircraft construction advice, standards and techniques, and they should be perused and the relevant literature obtained before construction actually commences.

7.2 Stage inspections

7.2.1 CASA requires that the aircraft be inspected at various stages of manufacture. This will normally be done by the recognised organisation. Note that the closing out of certain structure before a relevant stage inspection has been carried out may necessitate subsequent tear-down of the relevant section(s) to allow primary or critical structural inspections to take place, the responsibility for which rests with the builder.

7.2.2 The recognised organisation representative will physically inspect the aircraft structure, standards of workmanship, supporting documentation (covered in 10.3 below) and that the aircraft is being constructed in accordance with the approved drawings and specifications.

7.2.3 At the completion of each stage inspection, the recognised organisation will complete inspection documentation. The recognised organisation will provide detailed advice in this respect. Any unsatisfactory assessments will require re-inspections to take place.

7.3 Document requirements

7.3.1 CAO 101.28 recommends builders maintain a construction log for the duration of the project. This can be a very useful document for managing ABAA aircraft projects and should be made available at stage inspections. The following information should be placed in the log:

a. details of work carried out. This is best completed in tabular form, with relevant dates and manhours included against the work details (milestones);
b. material and component sources of supply, purchase details, specifications, purchase receipts and release notes (if applicable);
c. mixing records for glues and epoxies;
d. details of all inspections carried out, with dates and persons involved;
e. details of any changes to drawings or specifications, including copies of all approved paperwork;
f. photographs of critical structural components and areas; and
g. certifications made by other fabricators i.e. welding.

7.4 The major portion rule

7.4.1 The major portion of an amateur-built aircraft must have been fabricated and assembled by the relevant amateur builder(s). The major portion means more than 50 percent.

7.4.2 For a plans-built aircraft, there will not be any doubt that the major portion rule will have been met, as the majority of the whole aircraft structure will have been fabricated and assembled by the builder(s).

7.4.3 An aircraft built from a kit may be eligible for amateur-built certification, provided the major portion of the aircraft has been fabricated and assembled by the amateur builder. Kit owners may jeopardise eligibility for amateur-built certification if they allow someone else to build, or even partially build, the aircraft on their behalf. The major portion of such kits may consist of raw stock such as lengths of wood, tubing, extrusions etc., which may have been cut to an approximate length. A certain quantity of prefabricated parts such as heat-treated ribs, bulkheads or complex parts made from sheet metal, fibreglass, or polystyrene would be acceptable, provided the kit still meets the major portion of the fabrication and assembly requirements, and the amateur builder satisfies the person issuing the CoA that completion of the aircraft kit is not merely an assembly operation.

CAUTION: Purchasers of partially-completed kit aircraft should obtain all fabrication and assembly records from the previous owner(s). Without this documentation, the builder who completes the aircraft may find that the aircraft is ineligible for amateur- built certification.

7.4.4 Various material/parts kits for the construction of aircraft are available for use by aircraft builders. Potential builders should be aware that advertisements may be misleading as to whether a kit is eligible for amateur-built certification. It is not advisable to order a kit before verifying that the aircraft, upon completion, may be eligible for certification as an amateur-built aircraft.

7.4.5 Note that CASA does not certify experimental amateur built aircraft kits or approve experimental amateur built aircraft kit manufacturers. However, an authorised person or CASA may perform evaluations of kits which have potential for national sales interests, but only for the purpose of determining if an aircraft built from kits will meet the major portion criteria. A list of such known kits can be obtained from the SAAA and will also be placed on the CASA website for the information of prospective builders. CASA will normally accept kit evaluations performed by the FAA, and these will be added to the CASA website lists as appropriate.

7.4.6 A kit that has been evaluated by the FAA and assessed as meeting the major portion requirement will be accepted as meeting the Australian major portion requirement without any further showing.

7.4.7 Where an amateur-built aircraft has been built from a kit referred to in subparagraph 10.4.3 above, and no commercial assistance has been used during the project (as shown by the construction log), then there will be no need for a major portion rule determination by an authorised person or CASA during the final inspection phase.

7.4.8 Where no commercial assistance in a build project has been involved, a “Fabrication/Assembly Operation Checklist” (contained in FAA AC No. 20-139: Commercial Assistance During Construction of Amateur Built Aircraft”) may be used to cover the following cases:

a. the aircraft was built from a kit other than that covered by subparagraph 7.4.3 above and is the first of the type to be constructed in Australia; or
b. the aircraft was built from a kit that had been changed by the kit manufacturer after the date of eligibility for major portion determination had been established; or
c. settling any question with respect to the major portion requirement that may arise in the certification of an amateur-built aircraft.
d. If the Fabrication/Assembly Operation Checklist is not completed as advised, then a dispute between the builder, and the authorised person or CASA, may arise during the final inspection phase. In turn, inconvenient and costly delays could arise.
e. If commercial assistance is involved during the project, then the basic guidelines for processing of the Fabrication/Assembly Operation Checklist as per the previous paragraph 7.4.10 above still apply. The hours of work undertaken by the persons providing the commercial assistance are simply entered in the left-hand “accomplishments” column. Again, the total in the amateur-built column must be greater than the total of the other column. If not, the aircraft cannot be accepted as an amateur-built aircraft. The need for careful planning in apportionment of the work as described before and during construction of the aircraft is obvious.

7.4.9 Commercial instructional assistance may be obtained by the amateur builder in the fabrication or assembly of specific parts and the completion of certain tasks or processes involved in the construction of the aircraft. During all instructional activity, the amateur builder must be present to accomplish the tasks and all subsequent fabrication and assembly of parts for which commercial instruction is being rendered. Tasks completed by the amateur builder would be registered on the Fabrication/Assembly Operation Checklist in the “amateur builder” column. For example, assume instruction on fabrication of the wing ribs as listed on the checklist is required. Instructional activity could be provided to build the first few ribs, with the remainder to be completed by the amateur builder, with the column entries made to accord with this arrangement.

7.4.10 Commercial assistance may be obtained for non-checklist items on a kit that has been evaluated as meeting the major portion rule. A non-checklist item is a task or process that is not listed in the checklist. These items also include painting and the installation of interior upholstery or avionics beyond basic regulatory requirements. Such a task or process would not be required to be personally completed by the amateur builder for the aircraft to be assessed as meeting the major portion rule.

7.4.11 The amateur builder is not expected to have fabricated every component that makes up the completed aircraft. Non-checklist items would normally include the engines, propellers, wheels and brake assemblies, and other standard aircraft hardware. The installation of these items would be accomplished by the builder, and recorded as times in the amateur builder column on the checklist.

7.4.12 If commercial assistance other than that described in paragraphs 7.4.11 to 7.4.13 above is performed on the items listed in the checklist under “amateur builder”, on a kit as described in paragraph 7.4.7 above, the major portion evaluation previously performed will be invalid for that specific aircraft project. Consequently, it may result in a complete re- evaluation of the fabrication and assembly of that aircraft. This could put the amateur-built status of the aircraft in jeopardy. In other words, the aircraft will be treated as a non- evaluated kit and subject to complete evaluation by the authorised person or CASA when presented for certification as an amateur-built aircraft. The builder may want to obtain a pre-construction evaluation of proposed commercial assistance in writing from the authorised person or CASA to preclude certification problems at the completion of the project.

7.4.13 Commercial assistance does not include the instance where an incomplete aircraft is sold to another builder and the second or subsequent builder completes the aircraft. In such a case, the work performed by the first builder will count toward completion of the major portion by the second builder. The second or subsequent builder should obtain as much detailed information and documentation e.g. logbooks, material receipts, photographs etc., from the original builder as possible. This information will be important to the determination of the major portion requirement of the aircraft.

7.5 The final inspection

7.5.1 When construction has been completed, but prior to flight testing, a formal final inspection must be carried out. This is normally done by a recognised organisation.

7.5.2 Builders must obtain a copy of the checklist which will be used by the inspector for the final inspection, prior to that inspection being carried out, in order to minimise any procedural problems may occur during the actual inspection. The checklist used will be in a standard format, as used by the recognised organisation.

7.5.3 The builder must be in attendance at the inspection. The aircraft must be complete and ready to fly, except that cowlings, fairings and panels must be opened for the inspection. The aircraft should have completed a weight and balance exercise, carried out by an approved Weight Control Authority holder. Structure and control rigging checks, aircraft primary flight control duplicate checks, fuel flow checks, full power runs, compass swing, gear retraction test(s), and taxi tests, as applicable to the type, should also have been undertaken.

7.5.4 The following must be available for reference during the inspection and copies provided for retention by the inspector:

a. the construction log, as discussed in paragraph 7.3;
b. the completed Fabrication/Assembly Operation Checklist, if relevant to the aircraft (see paragraph 7.4 9 above);
c. aircraft logbooks. Note that certifications reflecting applicable ADs incorporated in the aircraft must be included in the logbooks;
d. the builders certification that the aircraft was built in accordance with the conditions of approval for manufacture. This must be inserted into the logbook;
e. LAME logbook certifications for dual control inspections, mechanical/avionics inspections, compass swing, fuel flow calibration, and radio installations;
f. all drawings and specification sheets, including drawings supporting approved modifications;
g. The weight and balance report;
h. a copy of the certificate of registration;

a copy of the noise exemption form (or other) from Airservices Australia (see subparagraph 7.5.5).

7.6 Noise certification

7.6.1 Noise certification for individual aircraft is required before the aircraft can be legally operated in Australian territory. Alternatively, there is a provision for certain aircraft to be exempt from noise certification. Aircraft noise is regulated through the Air Navigation (Aircraft Noise) Regulations, introduced under the Air Navigation Act 1920, in 1984. Noise certification or lack of such has no legal impact on type approval, or individual CoA issue. However, if an individual aircraft does not meet the Australian noise requirements, then it is illegal for that aircraft to operate in Australian territory, even though the aircraft may have a valid special CoA.

7.6.2 Application for noise assessment for individual aircraft can be made to:

The Manager Environment Monitoring
Airservices Australia

GPO Box 367
Canberra ACT 2601 Australia
Facsimile: + 61 (0)2 6268 4201
email: environment@airservices.gov.au

8 Registration and marking

8.1.1 Prior to application for issue of the experimental certificate, the aircraft must be registered and marked. Registration application procedures are fully described in AC 4701, “Registration of Aircraft”.

8.1.2 As well as the aircraft registration marks the following markings are also required:

a. an aircraft registration identification plate must be attached to an accessible location near an entrance;
b. an aircraft data plate with specific information imprinted on it must be fixed to the aircraft;
c. the word “EXPERIMENTAL” must be displayed on the aircraft near each entrance (interior or exterior) to the cabin or cockpit in letters not less than 5 cm nor 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. These may be temporary signs, given that they will not be required after the aircraft has received its special CoA in the amateur built category.

9 Experimental certification data

9.1.1 Flight testing of ABAA aircraft was previously carried out on the now-repealed regulation 134 of CAR 1988 Permit to Fly system. Such flight testing is now done on an experimental certificate. Permits to fly have been replaced by experimental certificates, pursuant to CASR Part 21, or special flight permits, pursuant to CASR Part 21, depending on the precise purpose for which the certificate or permit is being issued. Special flight permit purposes do not include flight testing, other than production test flying of commercially manufactured new aircraft. One of the prescribed purposes for which an experimental certificate can be issued is showing compliance with regulations, and this fits the amateur-built aircraft post-build flight test requirement.

9.2 Who may apply

9.2.1 The holder of the Certificate of Registration (CoR) is the only entity who may make application for issue of an experimental certificate. The CoR holder is that operator who has custody and airworthiness control of the aircraft, otherwise defined as the “owner”, who is normally the amateur builder.

9.3 Where to apply

9.3.1 Applications for the experimental certificates should be made to the organisation that has supervised the construction.

9.4 When to apply

9.4.1 The ideal time to make application for issue of the certificate is when construction of the aircraft is complete, but before the final inspection is about to take place (thus when the aircraft is ready for its first test flight). The certificate must be in force before the aircraft can be legally flown.

9.5 The application form

9.5.1 Application is made on the CASA Form 718, “Special Certificate of Airworthiness”.

9.5.2 The initial form details should be typed, or filled in using neat block letters and a blue or black pen, as follows:

a. Registration mark. Enter the aircraft’s registration mark after the VH – designator.
b. Manufacturer. Enter the name of the amateur builder as it appears on the aircraft data plate.
c. Serial number. Enter the serial number exactly as it appears on the aircraft data plate.
d. Type and model. Enter the type and model designation as they appear on the aircraft data plate.
e. Place and year of completion.

f. Category/Designation/Purpose. Tick the “experimental” and “show compliance” boxes in this block.
g. Details of applicant. This is self-explanatory.

10 Issue of the experimental certificate

10.1.1 For information on the issue of experimental certificates, refer to AC 21-10 “Experimental Certificates”.

11 Flight test requirements

11.1 General

11.1.1 The flight test program is required to establish that the aircraft has safe flying characteristics, and that all systems and components operate safely in the flight environment. A special CoA in the amateur built category can only be issued to an aircraft once the flight test program has been successfully completed. To this end, area and other flight restrictions are imposed.

11.1.2 There are two basic aims to be fulfilled in regard to this program:

a. completion of specific tests and checks as required by an approved flight test schedule; and
b. a period of satisfactory operation being established.

11.1.3 In regard to (a) above, the aim will be fulfilled if the applicant for eventual CoA issue follows the test requirements (and relevant checklists), contained in a publication specifically written by CASA for the flight testing of ABAA aeroplanes entitled “Flight Test Guide for Certification of CAO 101.28 Category Aeroplanes”. This, however, is not the only way that the requirements of CAO 101.28 can be satisfied.

11.1.4 In the case of FOT/FOM aircraft, all sections of the publication must be covered. In the case of all other aeroplanes, certain sections, relating to regulatory requirements for scheduled take-off, climb, approach and landing performance, and stability and control, may be omitted.

11.1.5 In regard to subparagraph 11.1.2 (b) above, the time period requirements are as follows:

a. for all aircraft, except gliders, not less than 5 hours flying time including 15 landings to a full stop, in the case of an aircraft type which has been certificated either in Australia or by a member state of ICAO, and not less than 15 hours flying time including 50 landings to a full stop in any other case i.e. the majority of ABAA types; and
b. for gliders, not less than 2 hours flying time including 5 launches by each method approved for the type, in the case of glider type which has been certificated either in Australia or by a member state of ICAO, and not less than 5 hours flying time and 10 launches by each method approved for the type in any other case. Note that other aspects of amateur-built (ABAA) gliders are discussed in paragraph 20 of this AC.

11.1.6 Enquiries regarding flight test requirements for rotorcraft should be directed to the CASA Test Pilot (see subparagraph11.2.5 (b) for contact details).

11.1.7 Copies of the Flight Test Guide may be obtained from recognised organisation sources.

11.2 Pilot qualifications

11.2.1 The minimum qualification a pilot must hold to carry out the initial flight testing on an ABAA aircraft is a Private Pilot Licence (PPL) with the appropriate endorsements.

11.2.2 Paragraph 5.79(2)(b) of CAR 1988 allows a PPL holder to fly an aircraft without the appropriate endorsement for the purpose of "(i) testing the aeroplane; or (ii) carrying out an experiment in relation to the aeroplane", if CASA has given the holder permission in writing under subregulation 5.50(1) of CAR 1988 to fly the aeroplane in those circumstances.

11.2.3 Similar provisions exist for the holders of PPLs in helicopter and gyroplane classes. When amateur-built gliders are involved, the GFA or CASA will advise the builder on minimum pilot qualifications as appropriate.

11.2.4 Advice regarding FOT/FOM aircraft flight testing has already been provided in paragraph 11.1 above. In the case of non-FOT/FOM aircraft, the nominated pilot's qualifications and experience will be reviewed by the recognised organisation at the time of application for the experimental certificate. Recent experience, experience on equivalent configuration aircraft e.g. tailwheel aircraft, and total hours experience, are all factors taken into account in this exercise. For further information on this policy, contact the recognised organisation.

11.2.5 Amateur builders can also receive further advice in this respect from the following sources:

a. The Flight Test Society of Australia (FTSA), GPO Box 2603, Canberra, ACT, 2601; or
b. The CASA Test Pilot, CASA, GPO Box 2005, Canberra, ACT, 2601.

11.3 Flight test area

11.3.1 Amateur-built aircraft will initially be limited to operation within an assigned flight test area for the duration of the flight test program. The desired flight test area should be requested by the applicant and, if found acceptable by an authorised person or CASA (in consultation with Airservices Australia, and other persons as necessary and appropriate), will be approved and specified in the operating limitations. It will usually encompass the area within 25 nm in radius (or larger depending on the type and speed characteristics of the test aircraft) from the aircraft's base of operation or in a designated test area established by CASA and Airservices. The area selected by the applicant and submitted to the authorised person or CASA for approval should not be over built-up areas of a city or town or in congested airways so that the flight testing would not likely impose any hazard to persons in the airways or on the ground or water.

11.4 Flight test reference material

11.4.1 Amateur-built aircraft builders may also make reference to the U.S. FAA Advisory Circular No. 90 – 89A, "Amateur-Built Aircraft and Ultralight Flight Testing Handbook", prior to their flight programs commencing.

11.4.2 Those undertaking flight test programs may also derive benefit in consulting the following additional references, as applicable to the class of aircraft involved:

a. CAA Report AF — 56, “Flight Test Guide for Certification of CAO 101.55 Aeroplanes”;
b. U.S. FAA AC 23 – 8A, “Flight Test Guide for Certification of Part 23 Airplanes”; and
c. U.S. FAA AC 27 – 1, “Certification of Normal Category Rotorcraft”.

11.5 Safety aspects

11.5.1 As per the appropriate Flight Test Guide.

11.6 Maintenance

11.6.1 All maintenance is to be performed in accordance with all instructions appearing in the aircraft’s log book.

11.6.2 Amateur builders may be able to apply to CASA for a maintenance authority.

12 Application for a certificate of airworthiness

12.1.1 For details on the application process for a CoA, refer to AC 21-03, “Special Certificates of Airworthiness”.

13 Aircraft constructed outside Australia

13.1.1 It is not uncommon for a builder to undertake construction while resident in another country, with the intention of returning to Australia to complete the project. There is nothing to legally preclude this, and the guidelines in this AC will apply.

13.1.2 If a builder wishes to complete the aircraft and operate it while still resident in another country, then the requirements of that country must be adhered to.

13.1.3 If a completed aircraft is purchased for import to Australia, ten it will not be eligible for certification in this category, and the owner should refer to AC 21-04 “Amateur Built Experimental Aircraft — Certification”.

14 Moving to and from amateur-built (experimental) category

14.1.1 Nothing would preclude an ABAA aircraft from being moved to amateur-built experimental status, as long as the requirements of CASR 21.193 and AC 21-044 were met.

14.1.2 An amateur-built experimental aircraft may have the potential to be moved to the ABAA category; the former is fully described in a companion AC 2104, “Amateur-Built Experimental Aircraft-Certification”. However, applicants for issue of the relevant special CoA in the ABAA category must carefully note the following:

a. the aircraft must be shown to meet all the requirements of CASR 21.190, “Amateur-Built Category Aircraft Accepted under an ABAA”;
b. an ABAA issued by CASA must cover the type involved;
c. the aircraft must have been built under the terms of an amateur-built workshop approval issued by an authorised person or CASA;
d. the aircraft must have been subjected to stage inspections. If this is has not been the case, the applicant must be prepared to partially disassemble/de-skin the aircraft as required to accommodate a possible detailed structural inspection by an authorised person or CASA; and
e. the maintenance requirements for amateur-built ABAA aircraft should have been fulfilled and documented whilst the aircraft was operating as an experimental aircraft. Otherwise the need for a full maintenance review/assessment may arise.

15 Instrument flight rules approval

15.1.1 It should be noted that Instrument Flight Rules (IFR) operational capability of an aircraft is not only a function of the instruments, navaids and other avionics fitted to that aircraft. The type involved must also exhibit particular minimum handling and stability standards. For commercially manufactured type certificated aircraft, this is all assessed during the flight certification phase.

15.1.2 An amateur-built design may have an IFR approval. This will normally be reflected in the master ABAA document. If this is not the case, the CASA Test Pilot will be required to be involved in the flight stability assessment and approval process. IFR type approval is the sole responsibility of CASA.

15.1.3 Other requirements include:

a. minimum equipment fit requirements, to be in accordance with CAO 20.18, “Aircraft Equipment – Basic Operational Requirements”;
b. fitment of a type certificated engine;
c. approval by CASA of an Electrical Loads Analysis; and
d. radio installation data contained in an aircraft radio logbook.

16 Rotorcraft

16.1.1 The title of CAO 101.28 is “Airworthiness Certification Requirements – Amateur-Built Aeroplanes”. Equivalent standards and requirements for amateur-built rotorcraft do not exist in the CAO 101 series. Note: only a few ABAAs exist for rotorcraft. For further information in this regard, contact a recognised organisation or CASA District Office.

17 Gliders and powered sailplanes

17.1.1 The basic processes for certification of amateur-built gliders and powered sailplanes are as described in this AC, but with one major exception: the delegated organisation is the Gliding Federation of Australia (GFA). Applicants for both type acceptance and individual glider or powered sailplane CoA issue should, at the very start of their project, contact the GFA. The contact details for the GFA are;

Gliding Federation of Australia
130 Wirraway Road
Essendon Airport Victoria 3041
Telephone: +61 (0)3 9379 7411
Facsimile: +61 (0)3 9379 5519

18 Sale of aircraft

18.1.1 There are no restrictions on the sale of an amateur-built (ABAA) aircraft. The special CoA is transferred with the aircraft, e.g. change of ownership and/or transfer of registration, etc. There is no inspection required as a result of a transfer of an aircraft with its CoA unless it is determined that any operating limitations which may be entered on the CoA Annex must be changed. In this case, a new CoA must be applied for by the new owner.

18.1.2 In regard to sale of an unfinished ABAA amateur-built aircraft, see again paragraph 7.4.4.

18.1.3 Importing agents of amateur-built aircraft kits may, under CASA approval, construct the first of the kit series under FOT/FOM aircraft amateur- built policies as described in this AC. This applies to the importer personally, and does not allow for the use of paid employees or contractors to carry out the construction. In return, CASA expects the agent will pass on the benefits of his or her experience and knowledge gained in building the aircraft, to purchasers of the kits. The aircraft may be sold on completion and certification.

19 Engine and propeller certification aspects

19.1.1 Approved engine/propeller combinations are specified in the ABAA master document. A non-specified engine/propeller combination will be subject to a separate approval process by CASA or an authorised person.

19.1.2 If a non-type certificated engine is fitted to an ABAA aircraft, then there are some operating implications which include:

a. a reduced stall speed requirement (refer paragraph 6); and
b. the aircraft may not operate IFR.

19.1.3 Conversions of automotive engines are generally processed in one of three ways:

a. use of approved drawings, or drawings and kits;
b. a full conversion is carried out from scratch. If this is to be followed, then the applicant will have to produce drawings, test plans, assembly and maintenance manuals etc., which must be approved by CASA, or an authorised person (in the latter case, a Reg 35 engineer). A workshop approval process is also involved; or
c. off-the-shelf, approved, converted engines also require a separate approval for fitment.

19.1.4 Non-certificated propellers may also be used in ABAA aircraft. They will also be subject to an approval process before a CoA can be issued to the individual aircraft, either by CASA or an authorised person. This could be through an engine analysis and/or test program, or through a safe history of operation process similar to that described in paragraph 4.1.6 (b). For further details on all of this, contact the recognised organisation or CASA.

Appendix A

CASA recognised organisations

A.1 CASA recognised organisations

Sport Aircraft Association of Australia (SAAA)

National Headquarters 265 Queens Parade Clifton Hill Victoria 3068

Tel: (03) 9482 4716
Fax: (03) 9482 3936