THE GLIDING FEDERATION OF AUSTRALIA INC.

DESIGN APPROVAL PROCEDURES MANUAL

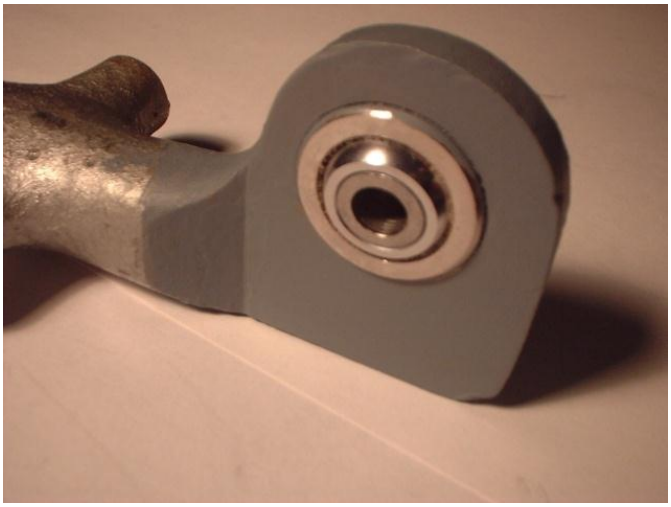
SECTION 1

(ISSUE 4)

CASA ACCEPTED

THIS SECTION OF THE MANUAL IS CASA ACCEPTED TO BE USED IN CONJUNCTION WITH THE CURRENT INSTRUMENT OF APPOINTMENT SHOWN IN APPENDIX (A)

(IOA number A & E 16/030 Dated December 15th 2016)



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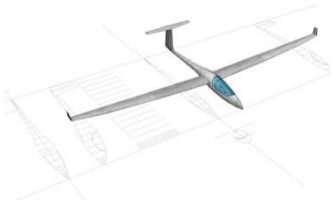

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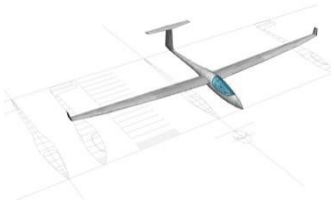
RECORD OF REVISIONS

Revision Number	**Issue Date**	**Amended By**	**Revision Details** (Ref Appendix (C))
3	December 2014	M Burns ARN 524173	Re-written to comply with CASA 2013 / 2014 guidelines for the issue of an Instrument of Appointment for CASR 21.M Design Approval.
4	December 2016	M Burns ARN524173	Amended front page for new IOA issued December 15th 2016 for 2 years expiring December 14th 2018



(1-1) ACCEPTED SECTION FOREWORD

This “Accepted” section of the DAPM seeks to outline the roles of GFA as an organisation and the CASR 21.M Design Approval authorised GFA members, undertaking the business of providing Design Approval for eligible projects. It must be clear that GFA as an organisation does not itself provide Design Approval. GFA provides the management system to make it possible for the 21.M AP’s to carry out their authorised functions for full CASR compliance. This section uses the acronyms detailed in the Introduction, refers to forms located in Appendix (B) and shall be read in conjunction with the current IOA shown in Appendix (A) which has total precedence over this section of the manual.

(1-2) PROJECT REGISTRATION

An Applicant, seeking Design Approval for a project, will start by completing GFA Form AIRW_F009 and submitting it to the GFA CAD for registration. The application should be made after informal investigation of the project proposal with either the CAD, CTO or a 21.M AP to ensure that there is no pre-existing work that could be utilised and that what is proposed, is feasible, with no obvious adverse influences on airworthiness or safety. Where possible, consultation with the original sailplane manufacturer is appropriate.

NOTE: It is not expected that the Applicant will have fully detailed engineering data available at the application stage, that will be developed by the Applicant and the allocated 21.M AP as the design approval is processed.

(1-3) PROJECT APPLICATION PROCESS

On receipt of the completed Form AIRW_ F009 and determining that the project falls within the scope of the 21.M AP Engineering Specialities, listed on the IOA, the CAD will:

1) Ensure the project is entered into the GFA Project Design Approval Application Register and allocated with a unique number, based on calendar years as shown in the register example in Appendix (B). The register is available for perusal by the GFA Board, Executive and CASA any time as needed. The unique identification number must be used on all project documentation, correspondence and reference material.

2) Ensure the project is allocated to a suitably qualified 21.M AP, or where more than one Engineering Speciality is involved, several 21.M AP’s will be appointed. One of the 21.M AP’s will then be nominated as Design Coordinator, responsible for the overall project coordination and final design approval.

3) Consult with the project DC to determine if the project falls into a *“Minor”* or *“Major”* category, following the process outlined in the Approved Section FIG (2-2). If that classification cannot be determined the CAD or DC will consult with CASA.

4) Confirm with the DC all of the relevant Design Standards that will need to be observed. That will usually be the choice of CS22, JAR22, BCAR Section E, OSTIV, LFSM. Some sailplanes may have FAA Certification and may have been certified under the FAA “Glider Criteria Handbook” Where an applicable Design Standard is not able to be determined, the CAD or DC will consult with CASA for guidelines.

5) Determine with the DC if the finished project will be an Approved Modification for one sailplane or a Supplemental Type Certificate for a Type, see Item (1-5).

6) Confirm the suitability of the nominated GFA maintenance authorised person to carry out and certify the physical incorporation of the project, in accordance with the GFA Manual of Standard Procedures, Part 3.

7) Ensure all relevant project documents are stored in the sailplane’s GFA G file.

(1-4) ADMINISTRATION

(1-4-1) ADVISORY MATERIAL AND AUDIT FINDINGS

The CAD may receive advisory material and audit findings from CASA, that material will be reviewed, actioned as required and filed for reference.

(1-4-2) ANNUAL ACTIVITY REPORT

The CAD will provide CASA with a Design Approval Activity Report (form AIRW_F023) in January each year for the previous calendar year's activities.

(1-5) APPROVED MODIFICATION OR SUPPLEMENTAL TYPE CERTIFICATE

INDIVIDUAL SAILPLANES

Where a modification is intended to only be applied to one individual sailplane then the final Design Approval will be specific to that sailplane, identified by Type, Serial No, VH registration and GFA G number. Not transferable.

SAILPLANE TYPES

If the final Design Approval is intended to cover all sailplanes of a particular type, (or types) then the final Design Approval must be in the form of a Supplemental Type Certificate. Supplemental Type Certificates can only be issued by CASA.

(1-6) THE AUTHORISED PERSON'S ROLE

Once the CAD has put the project into the GFA system the responsibility totally rests with the designated 21.M AP, (DC) the person who will provide Final Design Approval once all of the guidelines and processes have been met. Working to this manual and the conditions of the IOA, the 21.M AP observes the following:

1) Opens a project file which will have its own unique number from his or her register of design approval work (Note (B)) and reference to the GFA project register number.
2) Accumulates all of the data provided by the project Applicant.
3) Assesses the provided data to ensure suitability for further processing.
4) Accumulates all additional data, required references, standards and compliance material.
5) Assesses the impact of the project on any pre-existing AD's, Service Bulletins, repairs and modifications.
6) Completes the necessary engineering to facilitate final Design Approval.

NOTE (A) Where a modification is likely to affect flight characteristics, the 21.M AP may elect to request a test flight report before any physical work is undertaken, to provide a base reference for possible change comparison.

NOTE (B) The 21.M AP will maintain a register of all design approval work undertaken, in accordance with the IOA schedule. That register and all relevant project documents will be available at any time for GFA or CASA inspection.

NOTE (C) In the event of the 21.M AP ceasing to be a GFA member or ceasing to be a 21.M AP the AP's register, together with all relevant project files shall be forwarded to GFA for archiving.

(1-7) FINAL DESIGN APPROVAL DOCUMENTS

The majority of GFA projects fall into the Minor category, making the following the preferred way for the 21.M AP to present Final Design Approval, based on 2 approved documents:

(1-7-1) ENGINEERING ORDER

The project EO will be identified by its own unique number from the 21.M AP's personal project register and must highlight the GFA project register number. The affected sailplane or component and Applicant must be fully identified. The EO will fully detail the modification or repair including all materials and processes. It will call up all relevant drawings. It may contain a flight test schedule and may detail structural testing. It will also detail the required qualifications of the person/s undertaking the physical implementation. The document will be presented in draft form for flight test under an EC and fully design approved after structural, ground / flight tests and any rectifications are satisfactorily completed. The EO shall contain any approved Flight Manual Supplements (Ref 1-12) and continued maintenance requirements. (Ref 1-13) It may also include a sample log book entry to assist with ongoing airworthiness requirements.

The finally Design Approved EO, approved pursuant to CASR 21.437 becomes the authority for the designated GFA MAP to carry out the specified physical work and certify its completion by a signed log book entry and issue or re-validation of a Maintenance Release.

(1-7-2) ENGINEERING REPORT

The ER will contain all of the information required to justify final design approval of the project EO. (Ref sample form AIR_WF025) The ER will be identified by its own unique number from the 21.M AP's personal project register and must highlight the GFA project register number. The affected sailplane or component and Applicant must be fully identified. The ER will list and detail all design documentation, all references, all design standards, all matters of compliance, matters of equivalent safety, all structural test results, all ground / flight test results. The person checking input data (Ref 1-21) shall be recorded in the ER. The date the EO has final design approval issued will be shown in the ER.

The ER itself will be finally approved pursuant to CASR 21.009, thereby authorising final design approval of the project EO.

(1-8) NON DESIGN APPROVAL DOCUMENTS

These are supportive documents that are not required to be included in the ER for design approval. Examples of non-design approval documents are:

- Engineering notes and engineering change notes.
- Numerical, electrical and load analysis, raw data and data sheets.
- Ground and flight test schedules.
- General checking and internal audit procedures and reports.
- Experimental Certificate applications.
- Manuals supporting design, continuing airworthiness and operations.

(1-9) REFERENCE DESIGN LITERATURE

Each 21.M AP, involved in a project design approval may need access to as much reference design literature as possible, that will come in 2 forms, "**Approved**" and "**Informative**."

Approved documentation may be in the form of:

1) Type Certificate Data Sheets (TCDS)
2) Supplemental (STCDS)

3) Airworthiness Directives
4) Original Manufacturer's data approved by a recognised authority
5) Design data approved under CASA CAR 22, 22A, 35, 36, 36A, or 21.M
6) Data approved under CASA CAR 2A (ie AC43-13.1A/2B)
7) Data approved pursuant to CAR 36A, CAR 21.M for alternative replacement of components.
8) Data approved under CAR 36A, CAR 21.M for the use of alternative materials.
9) Personal records from previously completed design approved projects

Informative documentation may include accumulated GFA knowledge. These and other publications may also assist the Design Approval process.

10) GFA Manual of Standard Procedures Part 3
11) GFA Basic Sailplane Engineering
12) All relevant GFA Airworthiness Directives. General and specific
13) All relevant GFA Airworthiness Advice Notices. General and specific
14) Design of Wood Aircraft Structures (ANC 18)
15) GFA and manufacturer's approved FRP repair manuals
16) GFA Weight and Balance manual

(1-10) DRAWINGS

Drawings for all non-standard modifications and repairs are required in electronic or hard copy form. Drawings are to be sufficiently detailed to control the hardware required and processes to be performed.

1) Drawings to be numbered, origin identified, with provision to record changes
2) A parts list must be provided identifying each item of hardware required
3) Individual drawings will not be approved under CASR21.M

(1-11) COMPUTER SYSTEMS AND SOFTWARE

The 21.M AP shall prepare project documentation by computer and store the data in relevant files. The programs used shall be compatible with the current GFA office computer standards. Backing up will be completed under the 21.M AP's and GFA's normal business practice, but weekly is recommended.

(1-12) FLIGHT MANUAL SUPPLEMENTS

When the project design results in changes to the original, certified Flight Manual, the 21.M AP will provide supplemental pages formatted to match the original manual, observing page size, numbering, etc. The sailplane type, model number and serial number together with the relevant GFA Design Approval Register number shall be shown on the top right hand corner of each page. The FMS will be approved pursuant to CASR 21.006A.

(1-13) CONTINUED MAINTENANCE DOCUMENTS

Where a project design affects a system of maintenance the 21.M AP will advise the Applicant of technical aspects relating to the modification or repair, how to implement the changes and how to ensure continued airworthiness. This is usually documented in a supplement to the sailplane's original maintenance manual, presented as outlined in (1-12).

(1-14) EQUIVALENT SAFETY

Where an Equivalent Safety determination is required the 21.M AP in conjunction with the CAD may, by submission of a Design Advice, seek a CASA ruling, which when received will be complied with.

(1-15) STRUCTURAL TESTS

The 21.M AP who will be responsible for the Final Design Approval may deem it necessary to have structural testing carried out as part of the modification or repair justification. To set up a test schedule the following must be considered:

1) No parts of an operational sailplane can be "*Ultimate*" tested because those parts become un-airworthy. The test loading must be kept to "*Limit*" loading only, allowing the component or sailplane to return to service.

2) The structural test schedule must reflect the sailplane's original certification design requirements. (IE an L13 Blanik sailplane certified to BCAR section E would be tested to 5G (limit) not 7.5G (ultimate) Most testing is limited to minor components, winglets, harness attachments, battery tie downs etc.

3) It will usually be sufficient for structural testing to be witnessed by the 21.M AP and / or the Applicant. Should the test program be more significant the 21.M AP may consult with the CAD and a CASA observer may be requested.

4) All test equipment used will be calibrated and a record of the calibrations retained in the 21.M AP project file.

(1-16) STRUCTURAL RELIABILITY

Under GFA airworthiness management all sailplanes are subject to Life Inspections, (GFA AD 337 refers). Many sailplane types have a manufacturer's fatigue or service life in place. It is essential therefore that non-standard modifications or repairs do not infringe on those service lives. If there is infringement the 21.M AP must consult with the CAD for a review to be undertaken, possibly including CASA. However it is more likely that reliability will be restricted to minor issues such as tail wheels, water ballast bags, wheel brake systems etc.

(1-17) FLUTTER

By their nature, sailplane structures and control systems are extremely sensitive to flutter or in flight vibration. If the non-standard modifications or repairs affect structural aero elastic properties, control system elastic properties, or control surface weight and balance, before the 21.M AP applies for an EC or SFP for test flight, it may be necessary to have vibration tests or analysis completed. Factory certification flight testing is based on prototype wings having specific, measured wing frequencies, any significant lowering of that value must be investigated by flight test and manufacturer consultation if possible.

(1-18) PITCH MOMENT OF INERTIA

Non-standard modifications and repairs may not change the certified weight and balance limits of the sailplane, however they can change the Pitching Moment of Inertia. This may have significant effect on pitch stability and control, particularly spin entry and recovery and may need to be evaluated by flight test.

(1-19) FLIGHT HANDLING AND PERFORMANCE

When the 21.M AP decides that flight testing is required in order to demonstrate compliance with design standards, changes in handling or changes in performance, the 21.M AP or the Applicant will apply to GFA for an Experimental Certificate, using the current set of application forms and procedures requested by the CTO. The proposed test flight schedule shall be included with the EC application. Each project will have its own unique flight test requirements requiring a specific test flight schedule to be prepared and actioned. The schedule will have to encompass any EC limitations. This will require the services of a 21.M AP holding "*Flight Analyst* " authorisation. (Ref 1-3-2).

(1-20) TEST PILOTS / REPORTS

The 21.M AP will be responsible for arranging for suitable test pilots and observers to carry out required flight tests. In making their reports the test pilots and observers are to sign the reports to certify the veracity of the data presented. The 21.M AP will then, when needed, reduce the raw data to standard conditions. It may be necessary to implement design changes followed by additional flight testing before a final report can be produced.

(1-21) FINAL DESIGN APPROVAL

Before finally approving the design of a project the 21.M AP must check the ER (Ref (1-7-2)) input data for compliance with the nominated design requirements and the data has to be also checked by a responsible person. In the case of a project classified as "*Minor*" this will usually be the Applicant or constructor (GFA MAP), if adequately qualified. If the Applicant or constructor of the modification or repair is not qualified the 21.M AP may appoint an independent person for the first check and / or preparation of the data.

The finished Final Design Approval package issued to the Applicant will contain:

- The approved EO
- The approved ER
- The Flight Manual Supplements (if any)
- The Maintenance Manual Supplements (if any)

(1-22) GFA NOTIFICATION

The 21.M AP shall notify the GFA CAD that the Final Design Approval has been issued by forwarding a copy of the approved ER. (Ref (1-7-2)). The GFA CAD can then include the ER in the sailplane G file, update the Project Register and the Annual Activity Report.

(1-23) APPLICANT RESPONSIBILITY

Once the project receives final design approval the Applicant becomes the "*Design Approval Holder"* and as such is responsible for the continued airworthiness of the modification or repair design.