THE GLIDING FEDERATION OF AUSTRALIA INC.

DESIGN APPROVAL PROCEDURES MANUAL

SECTION 2

(ISSUE 4)

CASA APPROVED

THIS SECTION OF THE MANUAL IS CASA APPROVED TO FORM PART OF THE CURRENT INSTRUMENT OF APPOINTMENT SHOWN IN APPENDIX (A)

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

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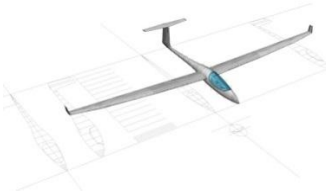

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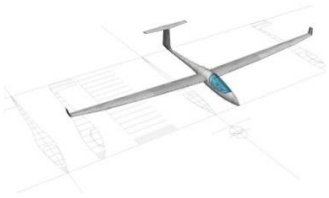
RECORD OF REVISIONS

Revision Number	Issue Date	Amended By	Revision Details (Ref Appendix C)
3	December 2014	M Burns ARN 524173	Rewritten 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 ARN 524173	Page 10 revised in accordance with CASA letter dated April 2015 requiring removal of references to EASA in Fig (2-2) replaced with CASA AC21-12 issue 1 reference.



(2-1) APPROVED SECTION FOREWORD

This "*Approved*" section of the DAPM broadly sets out the processes to be followed during Design Approval ensuring that the actions to be taken comply with the specific requirements. The Approval for the evaluation and associated assessments will only be conducted by GFA members authorized and listed in the Instrument of Appointment issued by CASA to the GFA for design approval activities. This section observes the acronyms listed in the Introduction and refers to GFA forms in Appendix (B).

The DAPM reflects CASA requirements and the engineering specialities listed on the IOA issued to GFA, relating to Design Approvals. This document shall be read in conjunction with the IOA, in the event that these documents conflict, the IOA has priority over the DAPM. The current IOA is shown in Appendix (A). This section may only be amended after receiving prior CASA approval. The details of each approved amendment are to be recorded in Appendix (C).

(2-2) CASR 21.M AUTHORISED PERSONS

All 21.M APs listed in the schedule of the IOA (see Appendix (A)) shall act in accordance with this manual, observing the conditions set out in the IOA, working inside the limits of their engineering speciality as listed on the IOA. In Addition the 21.M AP's will:

1) Review all projects against the design standards / requirements to identify any special conditions that may need to be included or modification of design standards / requirements that may need modification to address unsafe aspects. A statement to that effect shall be recorded in the design approval documentation. (Ref 2-3-2).

2) Assess each project to ensure there is no feature or characteristic that makes it unsafe for its intended use and certify for its compliance per the procedure in the Accepted section of this manual (Ref CASR 21.437 (4) (d)).

3) Review the implications of the project on other regulations such as CASR 39, CAR 37, 42Z, 21.197 which shall be addressed as appropriate. Applicability of CASR Part 90 shall be reviewed.

4) Issue the final design approval package including the ICA and flight manual supplements, identifying the holder of the approval along with details of the sailplane or component as contained in the application. All design documentation shall be reviewed by another person of suitable competence prior to issuing the design approval. (Ref 2-3-2).

5) Maintain a personal register of all work undertaken under the IOA. Copies of the register, and related project records to be made available for inspection by CASA or GFA.

(2-3) DESIGN APPROVAL DOCUMENTS

The prime documents required for final project design approval are:

Engineering Order	To be approved pursuant to CASR 21.437
Engineering Report	To be approved pursuant to CASR 21.009
Flight Manual Supplements	To be approved pursuant to CASR 21-006A

(2-3-1) 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 a structural testing schedule. 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 and instructions for continued airworthiness.

(2-3-2) ENGINEERING REPORT

The ER will contain all of the information required to justify final design approval of the project EO. (Ref GFA example form AIRW_F025) 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 matters of test article conformity, 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 authorizing final design approval of the project EO pursuant to CASR 21.437.

(2-3-3) FLIGHT MANUAL SUPPLEMENTS

The 21.M AP may approve changes to the original flight manual pursuant to CASR 21.006A as part of the project design approval provided it falls within the 21.M AP engineering speciality. The supplement format should match the original manual page format in size, layout and section numbering. The sailplane type, model, serial number and GFA design approval register number to be located in the top right hand corner of each page.

(2-4) DESIGN APPROVAL PROCESS

The project design approval process is schematically shown in Fig 2-1.

(2-4-1) DATA PACKAGE

(CASR 21.405) (GFA Form AIRW_F009) (CASR 420) (CASR 425)

The project Applicant will submit to the 21.M AP an initial data package which as a minimum shall contain:

- Applicant's name, address and contact details
- Make, model, serial number VH registration and GFA G number of the sailplane
- Make, model, serial number of engine, propeller or component
- A description of the project

- Proposed airworthiness standards and proposed means of compliance.

The 21.M AP shall review all of the initial data submitted by the Applicant to ensure suitability for further processing and project completion. The 21.M AP will request the Applicant to supply additional data as required to complete the project design approval.

That may include:

- Technical data related to the design
- Instructions for continuing airworthiness
- Inspection and test reports
- Flight Manual changes or supplements
- All additional data as requested

(2-4-2) ENGINEERING SPECIALTIES

The engineering speciality definitions (Ref 2-6) shall be followed by all 21.009 AP's. The 21.M AP acting as DC shall ensure that all relevant design requirements across all specialities are complied with and have the appropriate 21.009 approvals of the technical data before providing any approvals under CASR 21.437.

(2-4-3) DESIGN STANDARDS / REQUIREMENTS

(CASR 21.405)

Design standards / requirements range from early German LFSM to current EASA CS22. Where no suitable standard is available, the project 21.M AP shall forward a Design Advice, with sufficient information to describe the project, to CASA for determination of a suitable standard. The determined standard or requirement and any agreed variations will be recorded in the project ER.

(2-4-4) PROJECT CLASSIFICATION

Each registered project shall be assessed for Minor or Major classification. The process and procedures outlined in Fig 2-2 shall be followed. The majority of Design Approval projects undertaken by GFA members are Minor, these projects can be Design Approved by a 21. M AP with the appropriate engineering speciality, or, in combination with one or more 21.M AP's holding additional engineering specialities.

Where a 21.M AP considers the project (or part of the project) has a Major classification, a Design Advice is to be lodged by the project design coordinator with CASA, (Form 655 or equivalent), for determination.

In circumstances where Major or Minor is inconclusive a Design Advice shall be submitted by the project 21.M AP to CASA for a determination. The CASA response shall be complied with and recorded on CASA Form 979 (or equivalent).

(2-4-5) TESTS / CALIBRATION / CONFORMITY

For structural, ground and flight tests, all instruments and equipment used will be calibrated. The records of the equipment, calibrations and the test results shall be kept in the 21.M AP project file and used in the ER as required. The ER shall record all aspects of test article conformity.

(2-5) MANAGEMENT

(2-5-1) ACTIVITY REPORTS

Unless otherwise agreed to with CASA Design Approval Activity Reports will be submitted to CASA in January each year or after one hundred approvals whichever occurs first.

(2-5-2) AUDITS

All documents issued following a CASA audit shall be acquitted as per the CASA policy guidelines.

(2-5-3) EXEMPTIONS

Where there is an exemption, the details and conditions of the exemption shall be complied with. The exemption shall be recorded in the ER and noted in the document approval.

(2-5-4) DATA STORAGE

Data will be stored by electronic media and adequate storage and backup facilities will be provided to retain the data generated and used for design approval purposes.

(2-5-5) ADVISORY MATERIAL

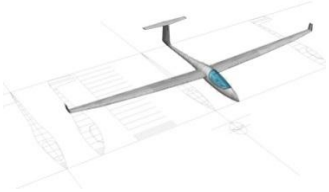
All advisory material supplied by CASA related to the design approval process shall be reviewed and any actions taken, pursuant to the advice, recorded.

(2-5-6) FOREIGN SAILPLANES

CASR 21.M cannot be used to approve projects carried out on foreign or state registered sailplanes. Any documents produced for foreign or state registered sailplanes shall have a statement *" Not approved under Australian Civil Aviation Safety Regulations "*

(2-5-7) CORRECTIVE ACTION REQUESTS

Requests for corrective actions (RCA) received by the GFA CAD or 21.M AP shall be acquitted as per CASA policy guidelines.



DESIGN APPROVAL PROCESS

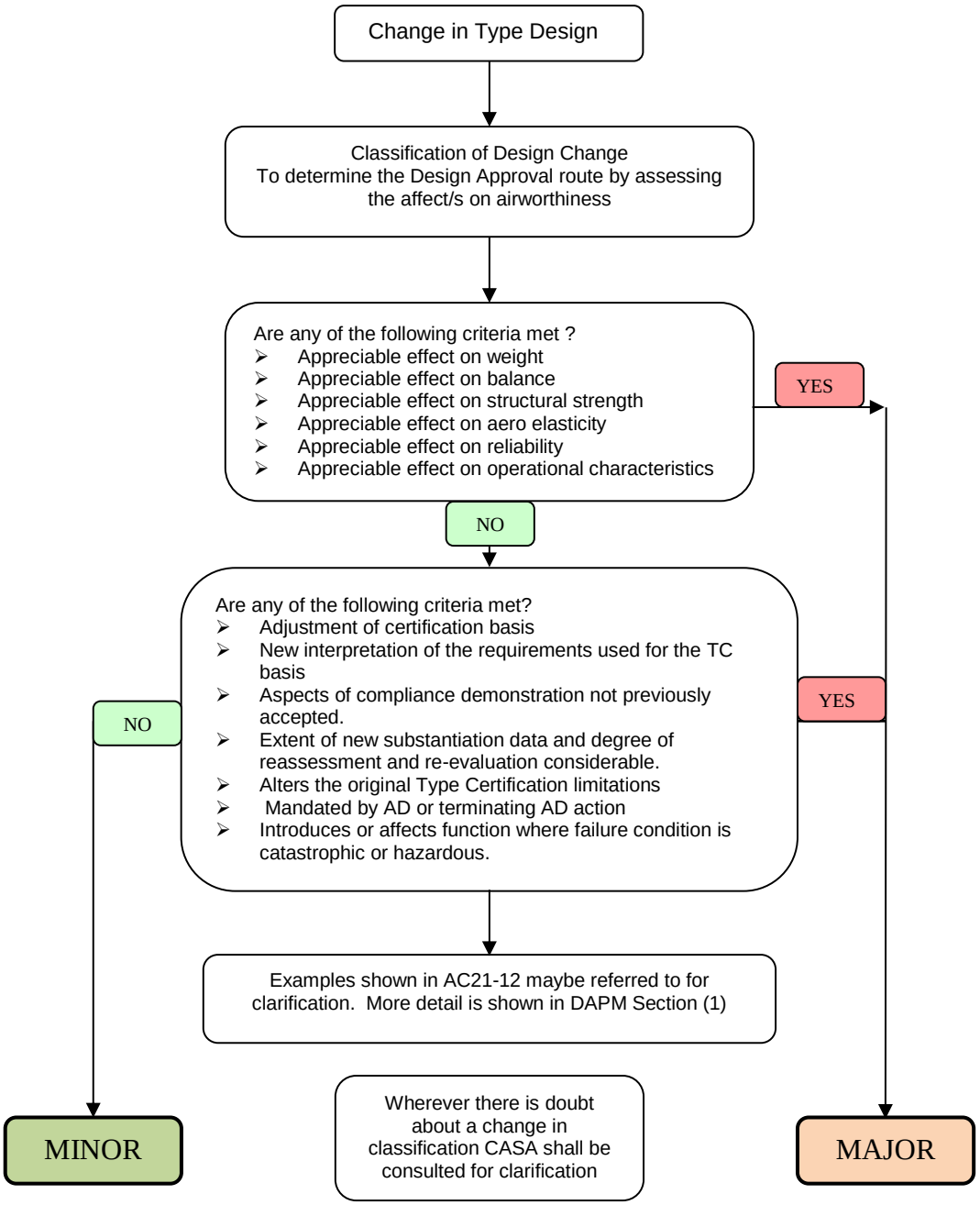
FIG (2-1)

MAJOR / MINOR CLASSIFICATION PROCESS

(Reference CASA AC21-12 issue 1)

FIG (2-2)

All non standard modification or repair projects requiring Design Approval shall be classified as either Major or Minor. The following guidance material is to be used based on CASA publication AC21-12 issue 1.



(2-6) ENGINEERING SPECIALITIES

(2-6-1) STRUCTURES

A 21.M AP with *Structures* speciality authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft structures including materials, parts and processes used. *"Structures"* includes the airframe fixed structure and structural aspects of moveable control surfaces, structural aspects of engine extend / retract systems, landing gear, doors, covers, fairings, engine cowling and equipment mounting and restraint.

(2-6-2) SYSTEMS AND EQUIPMENT (Mechanical)

A 21.M AP with *System and Equipment (Mechanical)* speciality authorization is to make findings of compliance and approve engineering reports,, drawings and data relating to the design of aircraft mechanical systems and equipment, including parts, materials and processes used; *Mechanical Systems and Equipment* includes, wheels, tyres, brakes, landing gear, hydraulics, pneumatics, pitot static systems, mechanical control systems, fuel systems, electrical control systems, electrical bonding, warning indicators, oxygen systems, cockpit and baggage compartment interiors and materials, (including flammability requirements) water ballast systems, seats, safety equipment and mechanical aspects of power plant installations, not covered by the engine or propeller design standards.

(2-6-3) SYSTEMS and EQUIPMENT (Electrical)

An *Electrical* specialty authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft electrical systems including materials and processes used. *Electrical* specialty includes: Electric power generation, storage, distribution and protection systems. Lighting systems; Mission specific additions or modifications (night sun, night vision comparable lighting, provision of power to role equipment, etc.); Fire / smoke detection systems; Combustion heaters; Aircraft electrical bonding; Data busses and multiplexing systems associated with the functioning of electrical systems; Warning indicators / annunciator panels.

(2-6-4) SYSTEMS and EQUIPMENT (Electrical – Limited)

An *Electrical-Limited* speciality authorization is to make findings of compliance for the following tasks:

- The repair, temporary / permanent removal and subsequent re-installation of existing equipment or simple systems.
- The design of new equipment or system installations provided that any integration to other existing aircraft systems is done in accordance with the equipment manufacturer's installation instructions.
- The modification of existing equipment or system installations providing any integration with other existing aircraft systems is done in accordance with the equipment manufacturer's installation instructions.

(2-6-5) SYSTEMS and EQUIPMENT (Instruments)

An *Instrument* speciality authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft instrument

systems, including materials and processes used. *Instrument* speciality includes: all indicating system instruments, composite indicators, multi functional displays and associated plumbing / wiring but excluding radio system indicating equipment and electrical meters; Automatic flight control systems; Integrated flight systems; Flight performance management systems; Pitot static systems; Air data systems; Oxygen systems; Inertial navigation / inertial reference systems; Data busses and multiplexing systems associated with instrument systems; Data recording systems including: (flight data recorder systems, health monitoring systems, engine parameter recording systems etc); Terrain Awareness and Warning System (TAWS) (including ground proximity warning systems but excluding radio inputs); Stall warning / indicating systems; Electronically displayed check lists (including some EFB – excluding radar displays); Heads-up displays; Synthetic vision systems; Enhanced Vision Systems; Infra-red systems; Active noise and vibration cancelling systems; Mission specific additions or modifications (instrument pods, camera systems etc).

(2-6-6) SYSTEMS and EQUIPMENT (Instrument – Limited)

An *Instrument - Limited* speciality authorization is the make findings of compliance for the following tasks;

- The repair, temporary / permanent removal and subsequent re-installation of existing equipment or simple systems.
- The design of new equipment or system installations provided that any integration with other existing aircraft systems is done in accordance with the equipment manufacturer's installation instructions.
- The modification of existing equipment or systems installation, providing any integration with other existing aircraft systems is done in accordance with the equipment manufacturer's installation instructions.

(2-6-7) SYSTEMS and EQUIPMENT (Radio)

A *Radio* speciality authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft radio systems including materials and processes used. *Radio* speciality includes; Communication systems (including emergency transmitters); Navigational systems (terrestrial and satellite); Composite indicators, excluding indicators containing gyroscopes; Audio distribution systems; In flight entertainment systems; Radar systems (including weather radar, radio altimeter and associated RAWS inputs); Transponders; Collision avoidance systems; Mission specific additions or modifications (Telemetric systems, role equipment using active transmitters etc); Securing the radio unit within its case /. Rack, the inter wiring of radio components and the bonding of all components of the radio system to the aircraft structure.

(2-6-8) SYSTEMS and EQUIPMENT (Radio - Limited)

An *Instrument – Limited* speciality authorization is to make finding of compliance for the following tasks:

- The repair, temporary / permanent removal and subsequent re-installation of existing equipment or simple systems.
- The design of new equipment or system installations provided that any integration with other existing aircraft systems is done in accordance with the equipment manufacturer's installation instructions.
- The modification of existing equipment or systems installation, providing any

integration with other existing aircraft systems is done, in accordance with the equipment manufacturer's installation instructions.

NOTE ON ELECTRICAL, INSTRUMENT AND RADIO SPECIALITIES

The instrument system wiring to the electrical power supply terminates at the distribution bus and includes the circuit breaker or fuse. The instrument system wiring supplying data signals to the radio system terminates at the connection to the radio system equipment or junction box. The radio wiring to the power supply of the electrical system terminates at the radio distribution bus and includes the circuit breaker or fuse.

(2-6-9) SOFTWARE

A *Software* speciality authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft software. The software speciality includes; Discrete software applications and operating systems installed in airborne electronic systems; The airborne electronic hardware systems fitted with custom micro-coded (programmable) components (e.g application specific integrated circuits (ASIC) or programmable logic devices (PLD's)

There are three categories:

- Flight Critical (Software Level A and B and Hardware Level A and B)
- Flight Non Critical (Software Level C and D and Hardware Level C and D)
- Non Flight Related (IFE) (Software Level E and Hardware Level E)

The levels identified above are those described in RTCA/DO 178B Paragraph 2.2.2 and DO254 Table 2.

(2-6-10) ENGINE

An *Engine* speciality authorization is to make findings of compliance and approve engineering reports, drawings and the data relating to the design of aircraft engines including materials, and processes employed in engine design, operation and maintenance.

(2-6-11) PROPELLER

A *Propeller* speciality authorization is to make findings of compliance and approve engineering reports, drawings and data relating to the design of aircraft propellers, including materials and processes employed in propeller design, operation and maintenance

(2-6-12) FLIGHT ANALYST

A *Flight Analyst* speciality authorization is to make findings of compliance with applicable aircraft flight requirements including performance, handling, stability and control. A Flight Analyst is responsible for ensuring that adequate flight tests are carried out and for the proper review and analysis of flight test data necessary to make findings of compliance . In addition, the Flight Analyst (Performance) is responsible for recommending approval of AFM performance data.

(2-6-13) MATERIALS AND PROCESSES

A *Materials and Processes* authorization is to make findings of compliance and approve engineering reports, drawings and data relating to material and process specifications including metallic or composite materials, fasteners, fluids, resins and consumables.