Civil Aviation Amendment Order (No. R92) 2004

I, WILLIAM BRUCE BYRON, Director of Aviation Safety, on behalf of CASA, issue the following Civil Aviation Order under paragraph 21.190 (1) (b) of the *Civil Aviation Safety Regulations 1998*.

[Signed Bruce Byron]

Bruce Byron
Director of Aviation Safety and
Chief Executive Officer

12 December 2004

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1 Name of Order

This Order is the Civil Aviation Amendment Order (No. R92) 2004.

2 Commencement

This Order commences on gazettal.

3 Replacement of section 101.28 of the Civil Aviation Orders

Section 101.28 of the Civil Aviation Orders is omitted and a new section substituted as set out in Schedule 1.

Schedule 1 Substitution of section 101.28 of the Civil Aviation Orders

SECTION 101.28

AIRWORTHINESS CERTIFICATION REQUIREMENTS — AMATEUR-BUILT CATEGORY AEROPLANES

1 APPLICATION

1.1 This section applies to an aeroplane (not being a powered sailplane):

(1) of which more than 50% is to be built by a person, or persons, who is, or are, resident in Australia or in Australian territory; and

(2) that is to be built for educational or recreational purposes; and

(3) that has a maximum take-off weight not greater than:

(a) in the case of an aeroplane other than a seaplane — 544 kg; or

(b) in the case of a seaplane with a single seat — 579 kg; or

(c) in the case of a seaplane with 2 seats — 614 kg; and

(4) that does not have more than 4 seats; and

(5) in which the stalling speed V_{SO} at maximum take-off weight does not exceed:

(a) in the case of an aeroplane with a type certificated engine — 61 knots CAS; or

(b) in any other case — 55 knots CAS; and

(6) in respect of which an application is to be made for the issue of a certificate of airworthiness in the amateur-built category.

1.3 In the absence of acceptable data regarding its stalling speed, an aeroplane shall be deemed to comply with the relevant stalling speed limitations of paragraph 1.1 if its maximum wing loading does not exceed the appropriate limit listed below:

(1) for aeroplanes fitted with type certificated engine(s):

(a) 65 kg/m^2 with a flap area of less than 6% gross wing area; or

(b) 80 kg/m^2 with a flap area of at least 6% gross wing area;

(2) for aeroplanes fitted with non-type certificated engine(s):

(a) 55 kg/m^2 with a flap area of less than 6% gross wing area; or

(b) 65 kg/m^2 with a flap area of at least 6% gross wing area.

2 DEFINITIONS

Unless a contrary intention is apparent, terms used in this section shall have the same meanings as defined in the airworthiness requirements of the country in which the aeroplane was originally certificated.

3 DESIGN STANDARDS

GENERAL

3.1 CASA may modify the design standards to be met if it considers that the standards specified in this subsection do not adequately relate to particular features or characteristics of an aeroplane type.

3.2 Non-compliance with a design standard may be accepted if it can be shown to CASA's satisfaction that such non-compliance is compensated for by factors that provide an equivalent level of safety.

3.3 Subject to paragraphs 3.4.2 and 3.4.3, an aeroplane of Australian design must comply with the design standards specified in paragraph 3.5 and subsequent of this subsection and with the design standards specified in Federal Aviation Regulation Part 23 of the United States of America or British Civil Airworthiness Requirements Section K, modified to the extent CASA considers acceptable with regard to their application to the particular design.

3.4 Subject to paragraphs 3.4.2 and 3.4.3, an aeroplane of overseas design must comply with the design standards specified in paragraphs 3.5 and subsequent of this subsection.

3.4.1 Flight Handling Qualities

An aeroplane to which this section applies must comply with the requirements of 1 of the following design standards in relation to flight handling qualities:

(a) British Civil Airworthiness Requirements Section S;
(b) Federal Aviation Regulations Part 23;
(c) Joint Aviation Requirements JAR-VLA (Very Light Aeroplanes).

Note: The Civil Aviation Safety Authority publication "Flight Test Guide for Certification of CAO 101.28 Category Aeroplanes" contains information on compliance with the requirements of the standards referred to in paragraph 3.4.1.

3.4.2 In spite of paragraphs 3.3 and 3.4, CASA may, in writing, exempt a particular aeroplane, or a class of aeroplanes, to which this section applies from compliance with specified provisions of this section.

3.4.3 An exemption under paragraph 3.4.2 is subject to the aeroplane exempted complying with such requirements (if any) as CASA specifies in the exemption as being necessary in the interests of safety and having regard to the purposes for which the aeroplane is to be used.

FLIGHT

3.5 Stalling speeds

(1) The stalling speed V_{SO} or minimum steady flight speed, in knots CAS, shall be determined with:
  (a) engine(s) idling with throttle(s) closed; and
  (b) propeller(s) in the take-off position; and
  (c) landing gear extended; and

(d) wing flaps in the landing position; and
(e) centre of gravity in the most unfavourable position within the allowable range; and
(f) weight used when V_{SO} is being used as a factor to determine compliance with a particular standard.

(2) The stalling speed, V_{S1} or minimum steady flight speed, in knots CAS, shall be determined with:
(a) engine(s) idling with throttle(s) closed; and
(b) propeller(s) in the take-off position; and
(c) aeroplane in the configuration relative to the condition in which V_{S1} is being used; and
(d) weight used when V_{S1} is being used as a factor to determine compliance with a particular standard.

(3) V_{SO} and V_{S1} shall be established by flight test in accordance with the following procedures:
(a) aeroplane trimmed, power off, at 1.5 V_{S1} or the minimum trim speed, whichever is the higher;
(b) the aeroplane speed reduced with the elevator control until the speed is slightly above the stalling speed, then the elevator control pulled back so that the rate of speed reduction will not exceed 1 knot per second until stall is produced as shown by an uncontrollable downward pitching motion of the aeroplane, or until the control reaches the stop.

3.6 Take-off distance

(1) The take-off distance shall be established and shall be the distance required to reach a screen height of 50 feet from a standing start, with:
(a) engine(s) operating within take-off power limitations; and
(b) wing flaps in the take-off position; and
(c) the aeroplane reaching the screen height at a take-off safety speed not less than 1.2 V_{S1}.

(2) The take-off distance scheduled in the aeroplane flight manual shall be that appropriate to a short dry grass surface.

(3) The take-off safety speed of not less than 1.2 V_{S1} shall be based on a stall speed V_{S1} established for the most critical centre of gravity position within the allowable range.

(4) Take-off charts, when included in the aeroplane flight manual, shall schedule distances established in accordance with the provisions of this paragraph, factored by 1.15.

3.7 Take-off climb

The steady gradient of climb shall be not less than 8% at sea level pressure altitude and a temperature of 15°C, and shall be established under the following conditions:

(a) maximum take-off weight;
(b) climb speed equal to the take-off safety speed;
(c) landing gear extended;
(d) wing flaps in the take-off position.

3.8 Baulked landing climb

(1) The steady gradient of climb shall be not less than 4% at sea level pressure altitude and a temperature of 15°C; and shall be established under the following conditions:
   (a) maximum landing weight;
   (b) climb speed not to exceed the approach speed;
   (c) engine(s) operating within take-off power limitations;
   (d) landing gear extended;
   (e) wing flaps in the landing position, except that, if safe and rapid retraction to at least the take-off position is possible without causing excessive change in angle of attack or loss of altitude and without requiring exceptional piloting skill, the flaps may be retracted.

(2) If compliance with the requirement in paragraph 3.8 (1) is conditional on wing flaps being retracted, a statement shall be included in the aeroplane flight manual detailing the procedure that shall be followed in the event of a baulked-landing manoeuvre.

(3) It must be possible to make a safe transition to the en-route climb configuration and speed from the airspeed selected by the applicant under paragraph 3.9 (1) (b).

3.9 Landing

(1) The landing distance shall be established and shall be the distance required to land and come to a full stop from a screen height of 50 feet above the landing surface, with:
   (a) wing flaps in the landing position; and
   (b) the aeroplane reaching the screen height at an approach speed of not less than 1.3 V_{SO}.

(2) The landing distance shall be that appropriate to a short dry grass surface.

(3) It must be shown that a safe transition to the baulked landing conditions of paragraph 3.8 can be made from the conditions that exist at the 50 foot height point.

(4) Landing charts, when included in the aeroplane flight manual, shall schedule distances established in accordance with the provisions of this paragraph, factored by 1.15.

3.10 Crosswind handling

A lateral wind velocity component at or below which it is safe to take-off and land shall be established.

3.11 Stall warning

There must be a clear and distinctive stall warning with wing flaps and landing gear in any normal position, in both straight and turning flight, sufficiently in advance of the stall to provide the pilot with adequate warning.

Note: The warning may be furnished either through inherent aerodynamic qualities of the aeroplane or by a device that will give clearly distinguishable indications under expected conditions of flight. However, a visual stall warning device that requires the attention of the crew within the cockpit is not acceptable by itself.

DESIGN AND CONSTRUCTION

3.12 Plastic, composite or fibre reinforced structural components shall be manufactured in accordance with specifications acceptable to CASA.

3.13 Wooden aeroplanes, in which the integrity of the primary structure depends on glued joints, shall not be assembled with acid catalysed phenolics and/or urea formaldehyde glues.

3.14 Cockpit and cabin

The design of the cockpit and cabin shall be such as to give each occupant every reasonable chance of escaping serious injury in a crash.

3.15 Seats

Seats shall not have hard edges or protruding parts which in a crash would be in a position likely to cause serious head injuries to a person seated and wearing correctly adjusted restraint equipment.

3.16 Flight manual stowage

Stowage shall be provided for the flight manual either in a container of the glove box type or in a special fixed container readily accessible to the pilot.

3.17 Bonding

(1) A positive method of bonding re-fuelling equipment to the aeroplane shall be, provided at each fuel filling point.

(2) A clearly identified external bonding point suitable for the attachments of ground connections shall be provided on each main undercarriage assembly or on the nose gear.

POWERPLANT

3.18 Engines and propellers

Each engine, including any additional shafting, gearing or other components connecting it with a propeller, and each propeller, shall be:

(1) type certificated or similarly approved for use in aircraft by a member state of the International Civil Aviation Organization in

accordance with an appropriate national code of requirements acceptable to CASA; or

(2) otherwise accepted by CASA as providing adequate levels of safety and reliability for the intended application.

3.19 Fuel tanks

(1) Where a fuel tank is located in, or immediately to, the rear of the cabin or cockpit, the tank shall be so designed and installed that it will not be ruptured or torn loose by inertia forces when the tank and its contents are subjected separately to the maximum of the flight load factors and the following emergency load factors applied separately:
   (a) 9g forward;
   (b) 3g upward;
   (c) 1.5g sideward;
   (d) 4g downward.

(1A) A factor of 1.33 shall apply to the fittings attaching the tank to the fuselage structure.

(2) All drain cocks or valves shall be of an approved wire-locked or self-closing type and be readily accessible. Drain plugs are not permitted.

(3) The design shall be such as to prevent water which may accumulate in the tank from being conveyed to the engine(s) in any normal attitude of the aeroplane.

Note: Where a conventional tank sump arrangement is impracticable a separate sediment bowl may be accepted provided it can be clearly demonstrated that the capacity of the sediment bowl is adequate for the purpose and that water will automatically drain from all parts of the tank to the sediment bowl when the aeroplane is in the normal ground attitude.

3.20 Fuel system

(1) Each fuel system shall be constructed and arranged to ensure that a fuel flow rate of at least 125% of the take-off fuel consumption of the engine(s) can be achieved under the most adverse conditions of aircraft attitude and fuel quantity.

(2) The fuel system shall be free from inverted “U” bends and other possible causes of air and vapour locks.

3.21 Powerplant cooling

The powerplant cooling provisions shall be capable of maintaining the temperatures of the engines, components, equipment and engine fluids within the relevant manufacturer’s established safe values for all conditions of flight and ground operation liable to occur within the limits of the ICAO intercontinental maximum standard climate.

3.22 Induction system icing protection

Engine air induction systems shall be designed and installed to prevent and eliminate icing.

3.23 Powerplant fire protection

(1) Except as provided in subparagraph (2) following, all line and hose assemblies carrying flammable fluids in engine compartments shall be fire resistant and the hose assemblies shall be of an approved type. For this purpose such components may be deemed to comply if capable of withstanding, at maximum working pressure, exposure to flame at a temperature of 1 090 ±30°C for 5 minutes without failure.

Note: Flexible hose assemblies approved as 'fire resistant' by the CAA or approved for use in engine compartments by the CAA or the FAA are acceptable, as are rigid lines and fittings composed of steel or copper-base alloys. Wire-braided flexible hose assemblies Types C and D of the FAA Technical Standard Order C53a ('normal' or 'high' temperature as appropriate) are acceptable, but, Types A and B are not likewise acceptable unless either their working pressures are less than 210 kPa or they are protected by properly secured external fire sleeves.

(2) The requirements of this subparagraph need not be applied to breather, vent and drain lines, the failure of which will not result in, or significantly add to, a fire hazard.

(3) Each engine compartment firewall or shroud shall be constructed of fireproof material and all openings in such firewall or shroud shall be sealed with close-fitting fireproof grommets, bushings or fittings, except that fire resistant seals may be used where the openings concerned would not allow the passage of a hazardous amount of flame in the absence of seals.

EQUIPMENT

3.24 Instruments and indications

(1) The scale graduations of airspeed indicators shall be in knots only with the scale as close as is practical to the periphery of the dial. The numbered graduations shall commence at a speed lower than the power-off indicated stalling speed of the aircraft in the landing configuration and at the minimum weight operationally possible.

(2) The height scale of altimeters shall be graduated in feet.

(3) The barometric subscale of sensitive altimeters shall include a calibration in millibars in increments not exceeding 2 millibars.

(4) Magnetic compasses shall be corrected and calibrated in accordance with section 108.6 of the Civil Aviation Orders.

(5) A landing gear position indicator is required if the aeroplane has a retractable landing gear.

3.25 Safety harnesses and inertia reels

(1) Each occupant shall be provided with a restraint consisting of at least a seat belt complying with section 108.42 of the Civil Aviation Orders or as otherwise approved by CASA.

(2) Each pilot seat and each cockpit front seat shall be fitted with a safety harness complying with section 108.42 of the Civil Aviation Orders, or as otherwise approved by CASA, and shall incorporate, where necessary to achieve compliance with paragraph 3.25 (3), an inertia reel complying with section 108.42 of the Civil Aviation Orders or otherwise approved by CASA.

(3) Each pilot with his seat, safety harness and any adjustable controls correctly adjusted for normal flight shall be able to:
   (a) without interference produce full and unrestricted movement of each control which he may be required to operate in flight, both separately and with all practical combinations of movements of other controls; and
   (b) at all positions of each control exert adequate control forces for the operation to be performed.

(4) The seats and restraints shall be designed to withstand the emergency load factors specified in paragraph 3.19 (1). An additional factor of 1.33 shall apply to the fittings transferring the emergency loads to the airframe.

OPERATING LIMITATIONS AND INFORMATION

3.26 Operating limitations

(1) Operating limitations shall be established and shall be approved by CASA. These limitations shall include all those upon which the aircraft design is based and all those which are applicable to:
   (a) weight and c.g. limits; and
   (b) loading; and
   (c) power-plant; and
   (d) airspeed; and
   (e) flight handling, including acrobatic manoeuvres.

(2) Acrobatic manoeuvres may be permitted where the airworthiness and structural integrity of the type has been justified to acrobatic standards to the satisfaction of CASA by the submission of:
   (a) evidence that the type complies with the design standards for acrobatic category aircraft specified in Federal Aviation Regulations Part 23 of the United States of America; or
   (b) evidence that a significant number of examples of the type have established a satisfactory service history in recognised competitive acrobatic contests.

(3) Amateur-built aeroplanes not fitted with type-certified engines will be limited to V.F.R. operations only.

3.27 Markings and placards

(1) Each marking and placard required by the subparagraph shall be displayed in a conspicuous and appropriate position, shall be capable of being easily read and shall not be easily erased, disfigured or obscured.

(2) Markings shall be placed on both the inside and outside of each exit door, hatch or canopy, indicating the position of the opening handles with the locks fully engaged and also providing essential operating instructions for opening.

Note: Where opening is achieved simply by turning a handle, a curved arrow pointing in the correct direction and the word "OPEN" will provide adequate instruction.

(3) Where the airspeed limitations are marked on the airspeed indicator they shall be as indicated airspeed and the following colour-code shall be used:

(a) for the never-exceed V_{NE}, a radial red line;

(b) for the caution range, a yellow arc extending from red line specified in (a) of this subparagraph to the upper limit of the green arc specified in (c) of this subparagraph;

(c) for the normal operating range, a green arc with the lower limit at the stalling speed or minimum steady flight speed V_{S1}, corresponding with maximum take-off weight and landing gear and flaps retracted, and the upper limit at the maximum structural cruising speed or normal operating limit speed V_{NO};

(d) for the flap operating range, a white arc with the lower limit at stalling speed or minimum steady flight speed in the landing configuration V_{SO}, corresponding with maximum take-off weight, and the upper limit at the flaps-extended speed V_{FE}.

(4) Where the power plant limitations are marked on the power plant instruments, the following colour-code shall be used:

(a) each maximum and, if applicable, minimum, safe operating limit shall be marked with a red radial line;

(b) each normal operating range shall be marked with a green arc not extending beyond the maximum and minimum continuous safe operating limits;

(c) each take-off and precautionary range shall be marked with a yellow arc;

(d) each engine speed range that is restricted because of excessive vibration shall be marked with a red arc.

(5) The aircraft shall contain the following placards:

(a) "THIS AIRCRAFT HAS BEEN CERTIFICATED IN THE AMATEUR-BUILT CATEGORY";

(b) except where acrobatic manoeuvres have been permitted under paragraph 3.26 (2) — "NO ACROBATIC MANOEUVRES (INCLUDING SPINS) PERMITTED";
(c) where the airspeed indicator is not marked with the colour-code described in paragraph 3.27 (3) — a placard listing the airspeed limitations;
(d) where the power-plant instruments are not marked with the colour-code described in paragraph 3.27 (4) — a placard listing the powerplant limitations;
(e) identification of the various functional positions of the controls of the fuel valves or cocks;
(f) on, or adjacent to, each fuel filler cap — "FUEL" and the minimum fuel grade designation for the engine and the usable capacity of the fuel tank;
(g) the compass calibrations;
(h) loading instructions if necessary to ensure that in all conditions of operation the aircraft centre of gravity will remain within limits;
(i) "NO SMOKING", unless:
    (i) fuel tanks fitted in the cockpit or cabin are isolated by means of vapour and fuel proof enclosures; and
    (ii) the cockpit and cabin linings, flooring and furnishing materials are at least flame resistant; and
    (iii) self-contained ash tray(s) are provided.

4 DOCUMENTS

For an aeroplane which is the first of a type or model to be issued with an Australian certificate of airworthiness the following data and documents shall be submitted for retention by CASA:

(1) For an aeroplane of Australian design, a report which substantiates that the aircraft complies with the design standards specified in subsection 3 of this section. Unless otherwise agreed to by CASA, the report shall include the following:
    (a) a specification of the aeroplane including its engine(s) and propellers(s);
    (b) a basic applied loads report;
    (c) a justification of all primary structural components, either by means of a detailed stress analysis, or a report of static test, or a report justifying the structure by direct comparison with existing certificated aeroplanes;
    (d) a flight test report.

(2) For an aeroplane of overseas design:

(a) evidence of the aircraft's overseas certification and operational status which may take the form of:

(i) a satisfactory service history recorded by examples of the type in respect of which certificates recognised by CASA as being evidence of the aircraft's airworthiness have been issued by the competent authority in a member state of the International Civil Aviation Organization; or

(ii) an adequate structural justification together with evidence of a satisfactory service history of the prototype; or

(iii) a copy of the equivalent of a certificate of type approval for the aircraft type issued by a member state of the International Civil Aviation Organization; and

(b) a statement from the aircraft designer detailing the limitations relating to weight, e.g. limits, loading, manoeuvres etc; the recommended engine and propeller and the range of engine powers permitted; the basic standard the aeroplane has been designed to; the date of the original design and prototype first flight and the number of the type flying; and

(c) all pertinent airworthiness and operational limitations for the aeroplane as recognised by the certificating authority in the country of origin; and

(d) where such exists — a copy of the flight or operator's manual relevant to the type or model as required by the certificating authority in the country of origin.

Note: Sports Aircraft of Australia Forms SAA/BS and SAA/DS provide satisfactory formats for presentation of the data required by sub-subparagraph (2) (a) (i) and subparagraph (2) (b).

(3) Drawings, which shall include a general arrangement drawing 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 shall clearly define the designers 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 intention.

Note: Additional design drawings may be required where, in CASA's opinion, the designer's intentions have not been clearly specified.

General Note: Attention is drawn to the fact that additional documentation is required with respect to individual aeroplanes of a type for the issue of certificates of airworthiness for the aeroplane.