Part 135 (Australian Air Transport Operations—Smaller Aeroplanes) Manual of Standards 2018

I, Shane Patrick Carmody, Director of Aviation Safety, on behalf of CASA, make the following Manual of Standards.

Dated

Shane Patrick Carmody **DRAFT ONLY—NOT FOR SIGNATURE**
Director of Aviation Safety

Contents

Chapter 1—Preliminary

1 Name

(1) This instrument is the *Part 135 (Australian Air Transport Operations—Smaller Aeroplanes) Manual of Standards 2018*.

(2) This instrument may be cited as the *Part 135 Manual of Standards*.

(3) Unless the contrary intention appears, references in this instrument to "this manual of standards", "this MOS" or "this instrument" are references to the Part 135 Manual of Standards.

2 Commencement

(1) Subject to subsection (2), this instrument commences immediately after the commencement of Part 135 of CASR.

(2) Section 81 commences 2 years after the commencement of this section.

3 Authority

This instrument is made under the *Civil Aviation Safety Regulations 1998*.

Note: Regulation 135.035 of CASR includes a general power for CASA to issue a Manual of Standards for the purposes of Part 135 of CASR (Australian air transport operations—smaller aeroplanes).

4 Definitions

In this instrument:

alternate aerodrome, for a flight of an aeroplane:

(a) means an aerodrome:

(i) to which the aeroplane may proceed when it becomes impossible or inadvisable to proceed to, or land at, the aerodrome of intended landing; and

(ii) where the necessary services and facilities for landing the aeroplane are available; and

(iii) where the aeroplane's performance requirements can be met; and

(iv) which is operational at the expected time of use; and

(b) includes the following:

(i) a take-off alternate aerodrome for the flight;

(ii) an en route alternate aerodrome for the flight;

(iii) a destination alternate aerodrome for the flight.

Note 1: The aerodrome from which a flight of an aeroplane departs may also be an en route alternate aerodrome, or a destination alternate aerodrome, for the flight.

Note 2: The expression ***alternate aerodrome*** has a different meaning for this instrument to that given in regulation 2 of CAR.

destination alternate aerodrome, for a flight of an aeroplane, means an alternate aerodrome at which the aeroplane may land if it becomes either impossible, or inadvisable, to land at the aerodrome of intended landing.

en route alternate aerodrome, for a flight of an aeroplane, means an alternate aerodrome at which the aeroplane may land if a diversion becomes necessary while en route.

ISA means international standard atmosphere.

LSALT means lowest safe altitude.

MTOW means maximum take-off weight.

passenger list, for a flight, means a passenger list for the flight, or other document, containing the information mentioned in subregulation 135.140(2) of CASR.

take-off alternate aerodrome, for a flight of an aeroplane, means an alternate aerodrome at which the aeroplane may land if this becomes necessary shortly after take-off, and it is not possible to use the departure aerodrome for the flight.

Chapter 2—General

Division 1—Flight-related documents

5 Carriage of documents

For paragraph 135.070(1)(a) of CASR, the following documents are prescribed:

(a) the aeroplane's flight manual;
(b) the aeroplane's flight technical log;
(c) if there is a maintenance release in force for the aeroplane—the maintenance release;
(d) if there is required to be a minimum equipment list for the aeroplane under regulation 135.050 of CASR—the aeroplane's minimum equipment list;
(e) if an operational flight plan for the flight is required under regulation 135.150 of CASR—the operational flight plan for the flight;
(f) the journey log for the flight;
(g) the authorised aeronautical information for the flight;
(h) if the flight is a passenger transport operation—a copy of the passenger list for the flight.

6 Carriage of documents for international flights

For paragraph 135.080(2)(a) of CASR, the following documents are prescribed:

(a) the aeroplane's certificate of airworthiness and certificate of registration;
(b) if the aeroplane's radio station licence is an apparatus licence issued under the *Radiocommunications Act 1992* for the radiocommunications equipment on board the aeroplane—the licence;

(c) if the aeroplane's radio station licence is a class licence issued under the *Radiocommunications Act 1992* for the radiocommunications equipment on board the aeroplane— a certified true copy of the licence;

(d) if the flight is a passenger transport operation—a copy of the passenger list for the flight;

(e) if the aeroplane is carrying cargo on the flight—the manifests for the cargo;

(f) a certified true copy of the operator's Australian air transport AOC;

(g) a copy of the operations specifications issued to the operator in relation to the operator's Australian air transport AOC.

7 Keeping and updating documents etc.

For paragraph 135.085(1)(a) of CASR, if the flight is a passenger transport operation, a copy of the passenger list for the flight is prescribed.

Division 2—Emergency and survival equipment

8 Information about emergency and survival equipment

For subregulation 135.105(1) of CASR:

(a) the equipment mentioned in column 1 of the items in the following table (the ***table***) is prescribed; and

(b) the information mentioned in column 2 of an item in the table is prescribed for the equipment mentioned in column 1 of the item.

Information about emergency and survival equipment

Item	Column 1 Equipment	Column 2 Information
1	Life raft	The number, colour and type of life rafts carried on the flight
2	Pyrotechnic signalling device	The number, colour and type of pyrotechnic signalling devices carried on the flight
3	First-aid kit	Details of the emergency medical supplies in the first-aid kit
4	Emergency locator transmitter	The number of emergency locator transmitters carried on the flight, and for each transmitter, whether the transmitter is fixed or portable
5	Emergency and survival equipment not mentioned in items 1 to 4	Details of other emergency and survival equipment carried on the flight, and, if emergency portable radio equipment is carried, the type and frequency of each radio

Chapter 3—Operational procedures

Division 1—Operational control

9 Flight distances (limitations)

(1) This section prescribes the requirements for subregulation 135.127(1) of CASR.

(2) A piston-engine, multi-engine aeroplane with a MTOW of more than 5 700 kg must not be flown further than the distance from an adequate aerodrome, for the flight, which the aeroplane can fly if flying at the relevant cruising speed for 60 minutes.

(3) Subject to subsection (4), a turbine-engine, multi-engine, aeroplane with a MTOW of more than 5 700 kg must not be flown further than the distance from an adequate aerodrome, for the flight, which the aeroplane can fly if flying at the relevant cruising speed for 180 minutes.

(4) Subsection (3) does not apply if the aeroplane's operator holds an approval, under regulation 135.030 of CASR, to conduct the flight with the aeroplane.

(5) In this section:

relevant cruising speed means the 1-engine inoperative cruising speed, in ISA conditions and still air, stated in the operator's exposition.

Division 2—Flight planning

10 Operational flight plans

For paragraph 135.150(2)(b) of CASR, the following information is prescribed:

(a) the aeroplane's registration mark;

(b) the flight number of the flight, if any;

(c) the date of the flight;

(d) the points of departure and destination for the flight;

(e) whether the flight is planned, whether in whole or part, to be a VFR flight at night, an IFR flight or both;

(f) the amount of fuel required to be carried on board the aeroplane for the flight under regulation 135.223 of CASR, and the actual amount of fuel carried on board the aeroplane for the flight;

(g) for the planned flight route for the flight:

(i) the route and route segments of the flight, including waypoints, distances and tracks; and

(ii) for a VFR flight at night or IFR flight—the published lowest safe altitude or the lowest safe altitude, as applicable, for each route segment of the flight; and

(iii) the planned cruising speed, and flying times between waypoints, for the flight; and

(iv) the planned altitudes or flight levels during the flight.

Division 3—Alternate aerodrome requirements

11 Operations to remote islands

(1) This section prescribes the circumstances and requirements for subregulation 135.180(1) of CASR.

(2) This section applies to an aeroplane that:
  (a) has more than 1 engine; and
  (b) is conducting a passenger transport operation or medical transport operation, which involves flying to a remote island.

Note: For a medical transport operation, this section applies whether or not a passenger is carried on the flight.

(3) The requirements are the following:
  (a) before the flight commences, the pilot in command of the aeroplane must nominate a destination alternate aerodrome for the flight;
  (b) the nominated destination alternate aerodrome, for the flight, must not be located on a remote island.

(4) However, the requirement stated in paragraph (3)(b) does not apply if the aeroplane's operator holds an approval, under regulation 135.030 of CASR, for the nominated destination alternate aerodrome, for the flight, to be located on a remote island.

(5) In this section:

remote island means:
  (a) Christmas Island; or
  (b) the Cocos (Keeling) Islands; or
  (c) Lord Howe Island; or
  (d) Norfolk Island.

Division 4—Fuel requirements

12 Purpose of Division 4

This Division prescribes the requirements for subregulation 135.223 (1) of CASR.

13 Definitions for Division 4

In this Division:

additional fuel means the supplementary amount of fuel required to allow an aeroplane that suffers engine failure or loss of pressurisation at the critical point along the route, whichever results in the higher subsequent fuel consumption, to:
  (a) proceed to an alternate aerodrome for the flight of the aeroplane; and

(b) fly for 15 minutes at a holding speed, and at the holding fuel consumption rate, for the aeroplane at 1 500 ft above the alternate aerodrome elevation, in ISA conditions; and

(c) make an approach and landing at the alternate aerodrome.

alternate fuel means the amount of fuel required to enable an aeroplane to do the following in a sequence:

(a) perform a missed approach at the destination aerodrome for the flight of the aeroplane;

(b) climb to the expected cruising altitude;

(c) fly the expected routing to the destination alternate aerodrome for the flight of the aeroplane;

(d) descend to the point where the expected approach is initiated;

(e) conduct the approach;

(f) land at the destination alternate aerodrome.

altitude means the vertical distance that a point or object is from MSL.

APU means auxiliary power unit.

ATS means air traffic service.

contingency fuel means the amount of fuel required to compensate for unforeseen factors during the course of a flight by an aeroplane, which must not be less than the higher of the following amounts:

(a) 10% of the trip fuel amount for the flight;

(b) an amount of fuel required to fly for 5 minutes at a holding speed, and at the holding fuel consumption rate, for the aeroplane at 1 500 ft above the destination aerodrome elevation, in ISA conditions.

established, for the definition ***holding fuel***, means any of the following:

(a) established by the aeroplane's manufacturer, and published in the aeroplane's flight manual;

(b) established by the use of a fuel consumption monitoring system;

(c) established by the aeroplane's operator and published in the operator's exposition, together with:

(i) the relevant data and methodology used; or

(ii) references to another accessible location of the data and methodology used.

final reserve fuel means the calculated amount of fuel that:

(a) is required to fly an aeroplane of the kind mentioned in column 1 of an item in the following table:

(i) for the kind of flight mentioned in column 2 of the item—for the period of the flight mentioned in column 3 of the item; and

(ii) at 1 500 ft above aerodrome elevation in ISA conditions; and

(iii) at holding speed; and

(iv) at the aeroplane's estimated weight on arrival at the destination aerodrome (the ***relevant aerodrome***) for the flight of the aeroplane, or the destination alternate aerodrome (also the ***relevant aerodrome***) for the flight, if required; and

(b) is usable fuel remaining in the aeroplane's fuel tanks on completion of the final landing at the relevant aerodrome.

Table Final reserve fuel requirements

Item	**Aeroplane** Column 1	**Kind of flight (by flight rules)** Column 2	**Final reserve fuel flight time** Column 3
1	aeroplane (piston-engine)	VFR flight by day or VFR flight at night	45 minutes
2	aeroplane (piston-engine)	IFR flight	45 minutes
3	aeroplane (propeller-driven turbine-engine))	VFR flight at night or IFR flight	30 minutes
4	aeroplane (turbojet-engine)	IFR flight or VFR flight	30 minutes

holding fuel means the amount of fuel an aeroplane requires to fly for the period anticipated for holding, taking into account the operating conditions, calculated at the holding fuel consumption rate established for the aeroplane for the anticipated meteorological conditions, or ISA conditions, as applicable.

Note: See also the definition ***established***.

MSL means mean sea level.

taxi fuel means the amount of fuel expected to be used before commencement of the take-off stage of a flight, taking into account:

(a) local conditions at the departure aerodrome for the flight; and

(b) APU consumption, if applicable.

trip fuel means the amount of fuel required to enable an aeroplane to fly from take-off, or the point of in-flight re-planning, until landing at the destination aerodrome for the flight, and includes the following:

(a) fuel for take-off and climb from departure aerodrome elevation to initial cruising level or altitude, taking into account the expected departure routing;

(b) fuel for cruise from top of climb to top of descent, including any step climb or descent;

(c) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure;

(d) fuel for executing an approach and landing at the destination aerodrome.

14 Fuel required to complete a flight

The operator, and pilot in command, of an aeroplane must consider the following matters when determining whether the aeroplane has sufficient fuel to complete a flight safely:

(a) either of the following aeroplane-specific fuel consumption data:
  (i) current aeroplane-specific fuel consumption data derived from an approved fuel consumption monitoring system, if available; or
  (ii) the aeroplane's fuel consumption data stated in its flight manual;

(b) the operating conditions for the proposed flight, including the following:
  (i) the anticipated weight of the aeroplane;
  (ii) relevant NOTAMS, which may affect fuel planning for the flight;
  (iii) relevant meteorological reports and forecasts;
  (iv) relevant ATS procedures, restrictions and anticipated delays;
  (v) the effects of deferred maintenance items and configuration deviations;

(c) the potential for deviations from the planned flight route because of unforeseen factors.

15 Amounts of fuel to be carried on board for a flight

(1) The pilot in command of an aeroplane must ensure that, when a flight of the aeroplane commences, the aeroplane is carrying on board at least the total of the following amounts of fuel:
  (a) the amount of unusable fuel stated in the aeroplane's flight manual;
  (b) the following amounts of usable fuel, calculated in accordance with subsection (2):
    (i) taxi fuel;
    (ii) trip fuel;
    (iii) contingency fuel;
    (iv) alternate fuel, if required;
    (v) holding fuel, if required;
    (vi) final reserve fuel;
    (vii) additional fuel, if applicable.

(2) The calculation, under paragraph (1)(b), must:
  (a) use the higher of the fuel consumption rates recorded in:
    (i) the fuel consumption data mentioned in paragraph 14(a); and
    (ii) the data obtained from the recording of fuel use in accordance with a procedure mentioned in subregulation 135.215(1) of CASR; and
  (b) take account of the operating conditions for the flight mentioned in paragraph 14(b).

16 Procedures for monitoring amounts of fuel during a flight

(1) An aeroplane's operator must have documented procedures to be followed by the pilot in command of the aeroplane, during a flight of the aeroplane, under which the pilot in command carries out fuel amount checks at regular intervals and determines the amount of useable fuel remaining on board at each interval by:

(a) comparing actual and planned fuel consumption for the flight; and

(b) checking whether the remaining useable fuel is sufficient to complete the flight to the destination aerodrome for the flight under subsection (2); and

(c) calculating how much useable fuel is expected to remain in the aeroplane's fuel tanks when the aeroplane lands at the destination aerodrome for the flight.

(2) For paragraph (1)(b), the amount of usable fuel required to be on board to continue the flight to the destination aerodrome, for the flight, must include the following:

(a) trip fuel;

(b) alternate fuel, if required;

(c) holding fuel, if required;

(d) final reserve fuel;

(e) additional fuel, if applicable;

(f) contingency fuel, if applicable.

(3) Also, the aeroplane's operator must have documented procedures that require the pilot in command to re-plan the flight and proceed to an en route alternate aerodrome for the flight if, under paragraph (1)(b), it is determined that the amount of useable fuel remaining on board is insufficient to complete the flight to the destination aerodrome for the flight.

(4) If the pilot in command re-plans the flight under subsection (3), the amount of usable fuel required to be on board to continue a flight from the point of in-flight re-planning must include the following:

(a) trip fuel;

(b) alternate fuel, if required;

(c) holding fuel, if required;

(d) final reserve fuel;

(e) additional fuel, if applicable;

(f) contingency fuel, if applicable.

17 Procedures if fuel reaches stated amount during a flight

(1) An aeroplane's operator must have documented procedures to be followed by the pilot in command of the aeroplane, during a flight of the aeroplane, as stated in this section.

(2) The procedures must state that:

(a) if, under subsection 16(1), it is calculated that the amount of useable fuel on board upon landing the aeroplane at the planned destination aerodrome for the flight would be less than the total of the alternate fuel, if required, and final reserve fuel, the pilot in command must:

(i) take into account the traffic and operational conditions likely to be prevailing on arrival at the planned destination aerodrome, the destination alternate aerodrome, or another en route alternate aerodrome, for the flight; and

(ii) proceed to any aerodrome mentioned in subparagraph (i) that will enable the pilot in command to perform a safe landing of the aeroplane with not less than the final reserve fuel remaining on board; and

(b) if, it is calculated, under subsection 16(1), that the amount of useable fuel on board upon landing the aeroplane at the planned destination aerodrome would be less than the final reserve fuel, the pilot in command must proceed to an en route alternate aerodrome, for the flight, which will enable the pilot in command to perform a safe landing at the aerodrome with not less than the final reserve fuel remaining on board.

(3) Also, the procedures must state that the pilot in command must request delay information from ATS when unforeseen factors may result in landing the aeroplane at the destination aerodrome with less than either of the following remaining on board:

(a) if alternate fuel is required—the total of alternate fuel and final reserve fuel;

(b) if alternate fuel is not required—final reserve fuel.

(4) Also, the procedures must state that the pilot in command must declare to ATS a "MINIMUM FUEL" state if:

(a) the pilot in command commits to land the aeroplane at an aerodrome (the ***chosen aerodrome***) under subsection (2); and

(b) it is calculated, under subsection 16(1), that if there is any change to the existing ATS clearance issued to the aeroplane to land at the chosen aerodrome, the aeroplane will land with less than the final reserve fuel remaining on board.

Note 1: The declaration of MINIMUM FUEL informs ATS that all planned aerodrome options have been reduced to a specific aerodrome of intended landing and any change to the existing clearance may result in landing with less than final reserve fuel. This is not an emergency situation, but an indication that an emergency situation is possible should any additional delay occur.

Note 2: Pilots in command should not expect any form of priority handling because of a MINIMUM FUEL declaration. ATS will, however, advise the flight crew of any additional expected delays as well as coordinate when transferring control of the aeroplane to ensure other ATS units are aware of the flight's fuel state.

(5) Also, the procedures must state that if, under subsection 16(1), it is calculated that the amount of useable fuel on board upon landing a radio-equipped aeroplane at the nearest aerodrome where a safe landing can be made would be less than the final reserve fuel, the pilot in command must declare to ATS a situation of "emergency fuel" by broadcasting "MAYDAY, MAYDAY, MAYDAY FUEL".

Division 5—Passenger transport and medical transport

18 Purpose of Division 5

This Division prescribes:

(a) the single-engine aeroplanes for subregulations 135.245(2) and 135.255(1), and paragraph 135.250(2)(a), of CASR; and

(b) the matters for subregulation 135.255(2) of CASR; and

(c) the requirements for paragraph 135.295(1)(a) of CASR.

19 Definitions for Division 5

In this Division:

relevant aeroplane means a single-engine aeroplane prescribed under section 20.

suitable forced landing area has the meaning given by regulation 135.020 of CASR.

20 Prescribed single-engine aeroplanes

For subregulations 135.245(2) and 135.255(5), and paragraph 135.250(2)(a), of CASR, a single-engine aeroplane approved by CASA under subparagraph 174D(2)(d)(ii) or 175A(1)(d)(ii) of CAR is prescribed.

21 Prescribed matters—engine malfunction or failure

(1) A prescribed matter, for subregulation 135.255(2) of CASR, is an engine malfunction or failure that happens during the take-off and initial climb stage of the flight, which makes it necessary, in the interests of safety, for the pilot in command of a relevant aeroplane to:

(a) abort the take-off; or

(b) after the take-off stage of the flight:

(i) if a suitable forced landing area, for the flight, is available—land the aeroplane on the area; or

(ii) if a suitable forced landing area, for the flight, is not available—land the aeroplane on the most suitable terrain for a forced landing in the vicinity of the aerodrome from which it took off; or

(iii) carry out a turn-back manoeuvre for the aeroplane.

(2) In this section:

turn-back manoeuvre, for the aeroplane, means a manoeuvre pre-determined by the aeroplane's operator, taking into account the minimum altitude and indicated airspeed required for the manoeuvre, by which the pilot in command of the aeroplane turns the aeroplane around after take-off and executes a glide approach to, and landing on, any part of the aerodrome from which the aeroplane took off.

22 Prescribed matters—decision speed

(1) A prescribed matter, for subregulation 135.255(2) of CASR, is the determination of the decision speed for a runway from which a relevant aeroplane is to take-off.

(2) In this section:

decision speed, for a runway, means the last speed a relevant aeroplane reaches, whilst travelling on the runway during take-off, at which the pilot in command of the aeroplane may elect to abort the take-off.

23 Prescribed matters—forced landing

(1) A prescribed matter, for subregulation 135.255(2) of CASR, is the conduct of a forced landing by a relevant aeroplane in VMC, or IMC, at an altitude of more than 1 000 ft above ground level, initiated during any of the following stages of a flight of the aeroplane:
   (a) climb;
   (b) en route;
   (c) descent;
   (d) approach to land.

(2) Also, a prescribed matter, for subregulation 135.255(2) of CASR, is the conduct of a forced landing by a relevant aeroplane in VMC, or IMC, at an altitude of not more than 1 000 ft above ground level.

24 Prescribed matters—engine ignition and performance

(1) A prescribed matter for subregulation 135.255(2) of CASR is the happening of any of the following events during a flight of a relevant aeroplane:
   (a) the activation of a chip detector system warning;
   (b) an uncommanded engine shutdown;
   (c) the exceeding of an engine performance parameter;
   (d) the activation of a fire warning;
   (e) engine failure.

(2) Also, a prescribed matter, for subregulation 135.255(2) of CASR, is electrical load shedding.

(3) In this section:

chip detector system means an engine oil metal contamination detection system.

25 Prescribed matters—suitable route and forced landing areas

(1) A prescribed matter, for subregulation 135.255(2) of CASR, is the assessment, before a proposed flight of a relevant aeroplane, of a suitable route for the flight.

(2) Also, a prescribed matter, for subregulation 135.255(2) of CASR, is the identification, before a proposed flight of a relevant aeroplane, of aerodromes and suitable forced landing areas, for the flight, which are available for a forced landing by the aeroplane during the flight.

26 Procedures—suitable route and forced landing areas

(1) In determining the procedures for the relevant matters, the operator of a relevant aeroplane must have regard to the following considerations:

(a) the nature of the terrain that would be overflown during a proposed flight;

(b) the weather information for the route of a proposed flight, including seasonal and other adverse meteorological influences that could affect the flight;

(c) the route limitations that limit the time for the aeroplane to be outside the glide range of a suitable forced landing area for a proposed flight;

(d) if water would be over-flown during a proposed flight:

(i) the ditching capability of the aeroplane's design, taking into account the requirement stated in paragraph 135.025(3)(a) of CASR; and

(ii) the identification of areas of water that meet the requirements stated in paragraph 135.025(3)(c) of CASR.

(2) For a relevant aeroplane operating on a fixed schedule, or a relevant aeroplane on a non-scheduled operation over water, to or from a particular aerodrome, the procedures for the relevant matters must state that the maximum time for the aeroplane to be outside the glide range of a suitable forced landing area, for a proposed flight, is 15 minutes at the normal cruise speed plus the time taken for a glide to 1 000 ft above ground level.

(3) The procedures for the relevant matters must state that before a proposed flight, the positions of aerodromes and suitable forced landing areas, for the flight, along the flight route must be programmed into the aeroplane's area navigation system.

(4) In this section:

relevant matters means the matters prescribed in section 25.

27 Safety briefing card

The information prescribed for subregulation 135.290(5) of CASR is the information that must be addressed in a safety briefing and instructions given, under regulation 135.295 of CASR, to a passenger for the flight of the aeroplane.

28 Safety briefings and instructions

(1) This section prescribes the requirements for paragraph 135.295(1)(a) of CASR.

(2) A safety briefing and instructions given to a passenger for a flight of a relevant aeroplane must address the following:

(a) the rules about smoking, or using e-cigarettes, during the flight;

(b) if the aeroplane's seats are adjustable—how to adjust a seat;

(c) if the aeroplane has a tray table or cot attached to the aeroplane—when the tray table or cot must be in its stowed position;

(d) if an infant or child is carried on the aeroplane—when and how the infant or child must be restrained;

(e) how and where to stow, or otherwise secure, carry-on baggage and personal effects, and the periods during the flight when these items must be stowed or secured;

(f) where the emergency exits are located, and how to use them;

(g) if the aeroplane is fitted with an escape path lighting system—where it is and how to use it to exit the aeroplane;

(h) if equipment to dispense supplemental oxygen is required to be carried on the aeroplane for the flight by regulation 135.620 of CASR—the location of the equipment and how to use it;

(i) if life jackets are required to be carried on the aeroplane for the flight by regulation 135.685 of CASR—where they are located and how to use them, and the giving of a warning that life jackets must not be inflated inside the aeroplane;

(j) if life rafts are required to be carried on the aeroplane for the flight by regulation 135.685 of CASR—where they are located and how to use them;

(k) if survival equipment, other than survival equipment contained in a life raft, is required to be carried on the aeroplane for the flight under a procedure mentioned in paragraph 135.730(2)(a) of CASR—the location of the equipment and how to use it;

(l) the limitations on the use of portable electronic devices during different stages of the flight;

(m) if a safety briefing card for the aeroplane is required, under regulation 135.290 of CASR, to be available to each passenger of the aeroplane:

(i) where to find the safety briefing card; and

(ii) if the safety briefing card sets out different seating configurations for the aeroplane—which configuration is in use for the flight;

(n) when seat belts must be worn during the flight, and how to use them;

(o) for a passenger seated in a seat adjacent to an emergency exit—what to do if it becomes necessary for passengers to use the exit;

(p) for a passenger with reduced mobility and any person accompanying or assisting the passenger during the flight—what to do if an emergency evacuation of the aeroplane is necessary;

(q) when, and how, to assume the brace position.

(3) The safety briefing and instructions may be given:
  (a) orally; or
  (b) by audio presentation; or
  (c) by audio-visual presentation; or
  (d) by a combination of the methods mentioned in paragraphs (a) to (c).

(4) However, if the person receiving the safety briefing and instructions is a passenger with reduced mobility, the safety briefing and instructions must be given in a form appropriate to the passenger or any person accompanying or assisting the passenger during the flight.

Chapter 4—Performance — smaller aeroplanes

Division 1—Preliminary

29 Application of Chapter 4

This Chapter applies in relation to the operation of the following aeroplanes:
  (a) a propeller-driven aeroplane with a MTOW of not more than 5 700 kg;
  (b) a jet-driven, single-engine aeroplane with a MTOW of not more than 5 700 kg;
  (c) a jet-driven, multi-engine aeroplane with a MTOW of not more than 2 722 kg.

30 Definitions for Chapter 4

In this Chapter:

aircraft landing area means an area of land suitable for use for the landing, or take-off, of aircraft.

approved landing factor, for a propeller-driven aeroplane, means the landing factor for which the aeroplane operator holds an approval under regulation 135.030 of CASR.

approved take-off factor, for a propeller-driven aeroplane, means the take-off factor for which the aeroplane operator holds an approval under regulation 135.030 of CASR.

factored landing distance: see section 38.

factored take-off distance: see section 32.

landing distance available, for a landing of an aeroplane at an aerodrome, means:
  (a) the distance stated by CASA as being the effective operational length available for use by the aeroplane for a landing at a certified aerodrome or registered aerodrome; or
  (b) the distance available for a landing on an aircraft landing area at an aerodrome, other than a certified aerodrome or registered aerodrome.

landing distance required, for an aeroplane, means the landing distance for the aeroplane calculated in accordance with the relevant requirements in the aeroplane's flight manual.

safe area, of an aerodrome, means an area of land or water, before the start of the landing distance available for a landing of an aeroplane at the aerodrome, which:

(a) has no obstacles; and

(b) has a surface that is not suitable to be used for the ground run of an aeroplane during landing.

standard landing factor means:

(a) for an aeroplane with a MTOW of not more than 2 000 kg—1.15; and

(b) for an aeroplane with a MTOW of more than 2 000 kg, but less than 4 500 kg—a factor derived by linear interpolation, between 1.15 and 1.43, according to the aeroplane's MTOW; and

(c) for an aeroplane with a MTOW of 4 500 kg or more—1.43.

standard take-off factor means:

(a) for an aeroplane with a MTOW of not more than 2 000 kg—1.15; and

(b) for an aeroplane with a MTOW of more than 2 000 kg, but less than 3 500 kg—a factor derived by linear interpolation between 1.15 and 1.25, according to the aeroplane's MTOW; and

(c) for an aeroplane with a MTOW of 3 500 kg or more—1.25.

take-off distance available, for a take-off of an aeroplane, means:

(a) the distance stated by CASA as being the effective operational length available for use by the aeroplane for the take-off at a certified aerodrome or registered aerodrome; or

(b) the distance available for take-off on an aircraft landing area at an aerodrome, other than a certified aerodrome or registered aerodrome.

take-off distance required, for an aeroplane, means the take-off distance for the aeroplane calculated in accordance with the relevant requirements in the aeroplane's flight manual.

Division 2—Take-off weights

31 Purpose of Division 2

The purpose of this Division is to prescribe:

(a) the circumstances in which a weight for an aeroplane for a flight must be calculated under paragraph 135.415(2)(a) of CASR; and

(b) the methods for calculating that weight under paragraph 135.415(2)(b) of CASR.

32 Meaning of *factored take-off distance*

The ***factored take-off distance*** required, for an aeroplane of the kind mentioned in column 1 of an item in the following table, is the take-off distance required for the aeroplane multiplied by the factor mentioned in column 2 of the item.

Factored take-off distance required		
Item	**Column 1** **Aeroplane**	**Column 2** **Factor**
1	Aeroplane for which: (a) there is a flight manual; and (b) there is no approved take-off factor	The standard take-off factor for the aeroplane
2	Propeller-driven aeroplane for which there is an approved take-off factor	The approved take-off factor for the aeroplane

33 Matters to be taken into account

The following matters must be taken into account when calculating the maximum weight at which an aeroplane can take off from an aerodrome:

(a) the take-off distance available for the runway, at the aerodrome, proposed to be used for take-off;
(b) the factored take-off distance required for the aeroplane;
(c) the pressure altitude, and temperature, at the aerodrome;
(d) the condition of the runway surface;
(e) the gradient of the runway in the direction of take-off;
(f) the headwind, if any, at the aerodrome;
(g) the tailwind, if any, at the aerodrome;
(h) the obstacles, if any, in the vicinity of the take-off path and en route;
(i) the forecast weather en route;
(j) the landing distance available for the runway proposed to be used at the destination aerodrome for the flight, or any runway which may be required to be used at a destination alternate aerodrome for the flight.

34 Approval of take-off factor for a propeller-driven aeroplane

CASA may, under regulation 135.030 of CASR, approve a take-off factor for a propeller-driven aeroplane, for operations at a particular aerodrome, which is less than the standard take-off factor for the aeroplane only if the proposed take-off factor has been risk-assessed by the aeroplane's operator for operations at the aerodrome.

35 Climb performance and obstacle clearance

(1) This section applies if the flight of an aeroplane is an IFR flight, or a VFR flight at night.

(2) The calculated take-off weight of the aeroplane must be a weight that allows the aeroplane to avoid obstacles and reach the published lowest safe altitude, or lowest safe altitude, as applicable, for the route, or a route segment, of the flight.

(3) Subsection (4) applies if the flight begins in VMC, but is not conducted wholly in VMC.

(4) The calculated take-off weight of the aeroplane must be a weight that allows, from the transition point for the flight, the aeroplane to reach the published lowest safe altitude, or lowest safe altitude, as applicable, for the route, or a route segment, of the flight if 1 engine fails.

(5) In this section:

transition point, for the flight, means the point in the flight at which the aeroplane stops flying in VMC and starts to fly in IMC.

36 En route obstacle clearance for multi-engine aeroplane

(1) The calculated take-off weight of a multi-engine aeroplane must be a weight that allows the aeroplane to fly in accordance with regulation 91.390, 91.400 or 91.403 of CASR, as applicable, if:

(a) an engine of the aeroplane becomes inoperative, during a flight, before the aeroplane reaches the planned cruising altitude for the flight; and

(b) each remaining engine of the aeroplane is operating within the maximum continuous power limitations stated in the aeroplane's flight manual.

(2) Subsection (1) does not apply if the aeroplane operator's procedures require the flight crew for the flight to plan, in the circumstances mentioned in subsection (1), for the aeroplane to return to the departure aerodrome, for the flight, or divert to the take-off alternate aerodrome, for the flight, clear of all ground, water and obstacles.

(3) The procedures mentioned in subsection (2) may include drift-down procedures that would allow the aeroplane to descend and land at an aerodrome with at least 2 000 ft vertical separation from all ground, water and obstacles within 5 nautical miles on either side, or ahead, of the aeroplane's track until established within the aerodrome's circuit area.

Division 3—Landing weights

37 Purpose of Division 3

The purpose of this Division is to prescribe:

(a) the circumstances in which a weight for an aeroplane for a flight must be calculated under paragraph 135.445(2)(a) of CASR; and

(b) the methods for calculating that weight under paragraph 135.445(2)(b) of CASR.

38 Meaning of *factored landing distance*

For an aeroplane mentioned in column 1 of an item in the following table, conducting a landing mentioned in column 2 of the item, the ***factored landing distance*** required is the landing distance required for the aeroplane multiplied by the factor mentioned in column 3 of the item.

Table Factored landing distance required

Item	Column 1 Aeroplane	Column 2 Landing	Column 3 Factor
1	Propeller-driven aeroplane for which: (a) there is a flight manual; and (b) there is no approved landing factor	A landing that is not part of a land and hold short operation	The standard landing factor for the aeroplane
2	Propeller-driven aeroplane for which there is an approved landing factor	A landing that is not part of a land and hold short operation	The approved landing factor for the aeroplane
3	Jet-driven aeroplane	A landing that is not part of a land and hold short operation	1.67
4	Aeroplane not mentioned in item 1, 2 or 3	A landing that is: (a) part of a land and hold short operation; and (b) on a dry runway into wind	1.67
5	Aeroplane not mentioned in item 1, 2 or 3	A landing that is: (a) part of a land and hold short operation; and (b) not on a dry runway into wind	1.92

39 Matters to be taken into account

The following matters must be taken into account when calculating the maximum weight at which an aeroplane can land at an aerodrome:

(a) the landing distance available for the runway proposed to be used at the destination aerodrome for the flight, or any runway which may be required to be used at a destination alternate aerodrome for the flight;
(b) the factored landing distance required for the aeroplane;
(c) the pressure altitude, and temperature, at the aerodrome;
(d) the condition of the runway surface;
(e) the gradient of the runway in the direction of landing;
(f) the headwind, if any, at the aerodrome;
(g) the tailwind, if any, at the aerodrome;
(h) the obstacles, if any, in the vicinity of the approach flight path.

40 Approval of landing factor for a propeller-driven aeroplane

CASA may, under regulation 135.030 of CASR, approve a landing factor for a propeller-driven aeroplane, for operations at a particular aerodrome, which is less than the standard landing factor for the aeroplane only if the proposed landing factor has been risk assessed by the aeroplane's operator for operations at the aerodrome.

41 Approval of short landing operation by day

(1) This section applies if an aeroplane's operator wishes to conduct a short landing operation at an aerodrome by day with the aeroplane.

(2) CASA may, under regulation 135.030 of CASR, approve the operation if:

(a) for an IFR flight—the operator's short landing operation minima for the aerodrome includes a runway visibility of at least 1.5 km; and

(b) the operator's exposition includes a set of operating wind limitations, referencing any headwind, crosswind and tailwind limits; and

(c) if the tailwind limit mentioned in the operator's exposition is zero—the operator's exposition states that there must not be a short landing operation at the aerodrome when a tailwind is present; and

(d) the operator demonstrates how the pilot aerodrome familiarisation and proficiency checking requirements, for a short landing operation, will be met by the operator's pilots in relation to the aerodrome; and

(e) the height at which the aeroplane will cross the beginning of the useable length of the aerodrome's safe area in a short landing operation is at least 50 ft; and

(f) the operator demonstrates how the operator's pilots will determine the height mentioned in paragraph (e); and

(g) the operator has the aerodrome operator's written approval to use the aerodrome's safe area to conduct a short landing operation with the aeroplane; and

(h) the width of the aerodrome's safe area, centred on the aerodrome runway centreline, is at least the greater of the following:

(i) twice the width of the runway;

(ii) twice the wing span of the aeroplane; and

(i) the aerodrome's safe area is not more than 90 m long; and

(j) the aerodrome's safe area does not have any hazards or other characteristics that would endanger an aeroplane undershooting the aerodrome's approach flight path; and

(k) no mobile object will be permitted on the aerodrome's safe area while the aerodrome is being used in a short landing operation; and

(l) the slope of the aerodrome's safe area does not exceed 5% upward, or 2% downward, in the direction of landing.

(3) In this section:

short landing operation, of an aeroplane at an aerodrome, means a landing of the aeroplane at the aerodrome where the airborne component of the landing distance required, for the aeroplane, commences at a position in the aerodrome's safe area.

Chapter 5—Performance — larger aeroplanes

Division 1—Preliminary

42 Application of Chapter 5

This Chapter applies in relation to the operation of the following aeroplanes:

(a) a propeller-driven, multi-engine aeroplane with a MTOW of more than 5 700 kg;

(b) a jet-driven, multi-engine aeroplane with a MTOW of more than 2 722 kg.

43 Definitions for Chapter 5

In this Chapter:

clearway means a defined rectangular area at the end of the take-off run available, at an aerodrome, on the ground under the control of the aerodrome operator, selected and prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height.

contaminated runway means a runway that has more than 25% of the runway surface area within the required length and width being used covered by:

(a) water, or slush, more than 3 mm deep; or

(b) loose snow more than 20 mm deep; or

(c) compacted snow or ice, including wet ice.

dry runway means:

(a) if an aeroplane's flight manual contains a definition of this term—the meaning of the term contained in the manual; or

(b) otherwise—a runway surface required to be used for the take-off or landing of an aeroplane at an aerodrome, which has no visible moisture on its surface and is not contaminated.

gross flight path means the flight path it is assumed an aeroplane will follow when flown in a particular configuration in accordance with specified procedures in ambient conditions, and that is established, from the aeroplane's certification performance data, as representing the average fleet performance of the aeroplane type.

landing distance available, at an aerodrome, means the length of runway declared to be available for the ground run of an aeroplane landing at the aerodrome.

net flight path means the gross flight path of an aeroplane reduced in elevation or extended in length by margins stated in this Chapter.

Note: The margins are to allow for factors such as deterioration in aeroplane performance and variations in pilot techniques in relating aeroplane performance to obstacle clearance.

RNP means required navigation performance.

OEM means Original Equipment Manufacturer.

stopway means a defined rectangular area on the ground at the end of the take-off run available, at an aerodrome, prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

take-off distance available means the total of:

(a) the length of the take-off run available; at an aerodrome; and

(b) if a clearway is provided at the aerodrome—the length of the clearway.

take-off distance required, for an aeroplane, means the take-off distance for the aeroplane calculated in accordance with the relevant requirements in its flight manual.

take-off run available, at an aerodrome, means the length of runway declared to be available and suitable for the ground run of an aeroplane taking off at the aerodrome.

V_1 means the take-off decision speed.

wet runway means a runway that:

(a) is covered by surface water not more than 3 mm deep; or

(b) is covered by slush or loose snow equivalent to surface water not more than 3 mm deep; or

(c) has sufficient moisture on the surface to cause it to appear reflective, but does not have significant areas of standing water.

Division 2—Take-off weights

44 Purpose of Division 2

The purpose of this Division is to prescribe:

(a) the circumstances in which a weight for an aeroplane for a flight must be calculated under paragraph 135.415(2)(a) of CASR; and

(b) the methods for calculating that weight under paragraph 135.415(2)(b) of CASR.

45 Matters to be taken into account

The following matters must be taken into account when calculating the maximum weight at which an aeroplane can take off from an aerodrome:

(a) the take-off configuration of the aeroplane;

(b) the take-off distance available for the runway, at the aerodrome, proposed to be used for take-off;

(c) the pressure altitude and temperature at the aerodrome;
(d) the condition, and type, of the runway surface;
(e) the gradient of the runway in the direction of take-off;
(f) unless otherwise accounted for in the performance data stated in the aeroplane's flight manual:
(i) not more than 50% of the headwind, if any, at the aerodrome; and
(ii) not less than 150% of the tailwind, if any, at the aerodrome;
(g) the loss of any runway length due to the aligning of the aeroplane for take-off;
(h) credit for the stopway, and clearway, at the aerodrome, which areas of land meet the requirements of the Part 139 Manual of Standards;
(i) the obstacles, if any, in the vicinity of the take-off path and en route;
(j) the forecast weather en route;
(k) the landing distance available for the runway proposed to be used at the destination aerodrome for the flight, or any runway which may be required to be used at a destination alternate aerodrome for the flight.

46 Accelerate stop distance and take-off distance

(1) This section states other requirements the operator, and pilot in command, of the aeroplane must take into account when calculating the maximum weight at which the aeroplane can take off from a runway at an aerodrome.

(2) The accelerate stop distance required for a take-off from the runway must not exceed the accelerate stop distance available for the runway.

(3) Subject to subsection (4), the take-off distance required for a take-off from the runway must not exceed the take-off run available for the runway.

(4) The take-off distance required for a take-off from the runway may exceed the take-off run available for the runway if:
(a) the take-off distance required for the take-off from the runway does not exceed the take-off run available for the runway, with the clearway distance required, for the take-off (not exceeding one-half of the take-off run available at the aerodrome) being added to the take-off distance available; and
(b) the take-off run required for the take-off from the runway does not exceed the take-off run available for the runway.

(5) For a take-off on a wet runway, or contaminated runway, at the aerodrome, the maximum weight at which the aeroplane can take off from the runway is the equivalent weight for a take-off on a dry runway at the aerodrome.

(6) In making the calculations for this section, a single value of V_1 for the rejected, or continued, take-off of the aeroplane from the aerodrome must be used.

(7) In this section:

accelerate stop distance available, for the runway at the aerodrome, means the length of the take-off run of the runway plus the length of the stopway, if available, at the aerodrome.

accelerate stop distance required, for a take-off of the aeroplane from the runway at the aerodrome, means the distance to accelerate and stop the aeroplane, determined by reference to the accelerate stop distance charts in the aeroplane's flight manual, taking into account:

(a) the aeroplane's weight and configuration; and

(b) the conditions at the aerodrome at the time of take-off.

47 Take-off obstacle clearance limitations

(1) This section states the obstacle clearance requirements that must be met in calculating the maximum weight at which an aeroplane can take off from an aerodrome.

(2) The aeroplane must not commence a take-off at the aerodrome if the aeroplane's weight exceeds the maximum weight at which its net flight path, following a failure of the critical engine that is recognised at V_1 appropriate to a dry runway at the aerodrome, would clear all obstacles in the aerodrome's take-off climb area by:

(a) at least a height of 35 ft vertically; or

(b) if the aeroplane has a wingspan of 60 metres or more—a horizontal distance of at least the total of the following:

90 metres + (0.125 x D)

(c) if the aeroplane has a wingspan of less than 60 metres—a horizontal distance of at least the total of the following:

(0.5 x the aeroplane's wingspan) + 60 metres + (0.125 x D)

(3) In making the calculation under subsection (2), the following matters must be taken into account:

(a) the weight of the aeroplane at the commencement of the take-off run;

(b) the following meteorological conditions:

(i) the pressure altitude;

(ii) the ambient temperature;

(iii) unless otherwise accounted for in the performance data stated in the aeroplane's flight manual, not more than 50% of the headwind, if any, and not less than 150% of the tailwind, if any.

(4) In making the calculation under subsection (2), the following apply:

(a) track changes must not be allowed up to a point at which the aeroplane's net take-off path has achieved a height equal to the greater of the following:

(i) one-half of the aeroplane's wingspan;

(ii) 50 ft above the elevation of the end of the take-off run available at the aerodrome;

(b) after the point mentioned in paragraph (a) and up to a height of 400 ft, it is assumed that the angle of bank of the aeroplane is no more than 15 degrees;

(c) above 400 ft height, a bank angle greater than 15 degrees but not more than 25 degrees, may be used;

(d) for any part of the net flight path in which the aeroplane is banked by more than 15 degrees, the aeroplane must clear all obstacles within the horizontal distances stated in subsections (2), (5) and (6) by a vertical distance of at least 50 ft;

(e) subject to an approval being given under regulation 135.030 of CASR for this purpose, the aeroplane's operator may use special procedures to apply increased bank angles of not more than 20 degrees between 200 ft and 400 ft, and not more than 30 degrees above 400 ft;

(f) adequate clearance must be made for the effect of bank angle on operating speeds and flight path, including the distance increments required from the increased operating speeds.

(5) In making the calculation under subsection (2), if the aeroplane's planned flight path does not require track changes of more than 15 degrees, any obstacles that have a lateral distance greater than either of the following does not need to be considered:

(a) if the aeroplane's pilot is able to maintain the required navigational accuracy from the departure end of the runway to the LSALT for the route—300 metres;

(b) otherwise—600 metres.

(6) In making the calculation under subsection (2), if the aeroplane's planned flight path requires track changes of more than 15 degrees, any obstacles that have a lateral distance greater than either of the following does not need to be considered:

(a) if the aeroplane's pilot is able to maintain the required navigational accuracy through the area delineated in subsection (2)—600 metres;

(b) otherwise—900 metres.

(7) In this section:

D means the horizontal distance the aeroplane will travel from the end of the take-off distance available at the aerodrome or, if a turn is scheduled before the end of the take-off distance available, the end of the take-off distance required for the take-off.

Note The calculation of *D* is limited by the expansion parameters, for the planned flight path, stated in subsections (5) and (6).

Division 3—Take-off area

48 Calculation of take-off area

(1) In VMC operations of an aeroplane, the take-off area is the area on either side of the planned flight path, after take-off from an aerodrome, within a lateral distance of at least the total of the following:

45 metres + (0.125 x D)

(2) For the calculation under subsection (1), the area more than 305 metres either side of the planned flight path need not be considered, unless the planned flight path involves a change of heading in excess of 15 degrees.

(3) If the planned flight path involves a change of heading in excess of 15 degrees, the lateral area will continue to expand throughout the turn, and the limiting lateral distance must be the greater of the following:

(a) 305 metres;

(b) the total of the following:

45 metres + (0.125 x D)

where **D** is measured to the point of completion of the turn.

(4) In this section:

D means the distance measured horizontally along the planned flight path and commencing from the end of the take-off distance available at the aerodrome.

Note The calculation of *D* is limited by the expansion parameters, for the planned flight path, stated in subsections (2) and (3).

49 Alternative take-off area requirements

(1) If subsection 35(1) does not apply, subject to subsections (2) to (4), the take-off area consists of the area on either side of the planned flight path of an aeroplane, after take-off from an aerodrome, within a lateral distance calculated using the formula:

90 metres + (0.125 x D)

(2) Obstacles at a distance greater than 600 metres on either side of the planned flight path need not be considered:

(a) if the planned flight path does not include a change of heading of more than 15 degrees; or

(b) in the case of operations conducted in VMC by day.

(3) If subsection (2) does not apply, obstacles at a distance greater than 900 metres on either side of the planned flight path need not be considered.

(4) Despite subsections (2) and (3), for an RNP-capable aeroplane engaged in an approved RNP operation, the expansion of the take-off area may be discontinued when the perimeter of the take-off area reaches:

(a) if RNP is set equal to or greater than 0.5 nautical miles—900 metres on either side of the defined flight path; or

(b) if RNP is set to or less than 0.2 nautical miles —370 metres on either side of the defined flight path; or

(c) if RNP is set to more than 0.2 nautical miles but less than 0.5 nautical miles—a distance on either of the defined flight path, derived by linear interpolation, between 370 metres and 900 metres according to the set RNP.

(5) In this section:

D means the distance measured horizontally along the planned flight path and commencing from the end of the take-off distance available at the aerodrome.

Division 4—En route performance

50 En route—1-engine inoperative

(1) An aeroplane must not commence a take-off at a weight more than that which, in accordance with the 1-engine inoperative en route net flight path data stated in the aeroplane's flight manual, provides compliance with paragraph (2)(a) or (b) at all points along the route.

(2) For subsection (1), the net flight path must:
  (a) have a positive gradient at 1 500 ft above the aerodrome where the landing is planned to be made after an engine failure; and
  (b) take into account the following:
    (i) normal operating altitudes;
    (ii) operating weights;
    (iii) ambient temperature anticipated along the route;
    (iv) if meteorological conditions require icing protection systems to be operable—the effect of their use.

(3) The 1-engine inoperative en route net flight path must at all points along the route comply with subsection (4) or (5).

(4) For an operation that does not involve a drift-down procedure, the gradient of the net flight path, at least 1 000 ft above the terrain or any obstacles along the route within the distance of 5 nautical miles on either side of the intended track, must be positive.

(5) For an operation involving a drift-down procedure:
  (a) the net flight path must permit the aeroplane to continue the flight from the cruising altitude to an aerodrome where a landing can be made in accordance with the landing distance requirements stated in division 4; and
  (b) the net flight path must provide clearance, by at least 2 000 ft, from all terrain and obstacles along the route within 5 nautical miles on either side of the intended track; and
  (c) the following requirements must be met:
    (i) the engine is assumed to fail at the most critical point along the route;
    (ii) account is to be taken of the forecast wind on the flight path;
    (iii) account is to be taken of fuel jettison, if applicable, consistent with the fuel requirements stated in the aeroplane's flight manual;
    (iv) the aerodrome where the aeroplane is planned to land after the engine failure is stated in the operational flight plan, and meets the landing performance requirements at the expected landing weight;
    (v) the meteorological forecast or reports, or any combination, must indicate that a safe landing can be made at the aerodrome at the expected time of landing.

(6) The aeroplane's operator must increase the route width margins stated in subsections (4) and (5) to 10 nautical miles where the navigational accuracy does not meet RNP 5.

51 En route—Aeroplane with 3 or more engines, with 2 engines inoperative

(1) Subject to subsections (2) to (5), an aeroplane with 3 or more engines must not at any point along its intended track be more than 90 minutes, at the All Engines Operating (***AEO***) cruise speed in ISA conditions and in still air, from an adequate aerodrome at which the landing performance requirements at the expected landing weight are met.

(2) Subsection (1) does not apply if the requirements stated in subsections (3) to (5) are met.

(3) For subsection (2), the following requirements must be met:
   (a) the 2-engine inoperative en route flight path must permit the aeroplane to continue the flight, in the forecast meteorological conditions, from the point where 2 engines are assumed to fail simultaneously, to an aerodrome where a safe landing can be made taking into account the 2-engine inoperative landing procedures;
   (b) the net flight path must clear vertically, by at least 2 000 ft, all terrain and obstructions along the route within:
      (i) 5 nautical miles when navigational accuracy meets at least RNP 5; or
      (ii) 10 nautical miles;
   (c) at altitudes and in meteorological conditions requiring the use of ice protection, the effect of their use on the net flight path must be taken into account.

(4) Also, for subsection (2), the 2 engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is more than 90 minutes, at the AEO cruise speed in ISA conditions and in still air, from an aerodrome at which the OEM 2-engine inoperative landing performance requirements at the expected landing weight are met, and the following requirements must be met:
   (a) the net flight path must have a positive gradient at 1 500 ft above the aerodrome where the landing is planned to be made after the failure of 2 engines;
   (b) fuel jettison is permitted consistent with the required fuel reserves, and subsection (3) can be met.

(5) Also, for subsection (2), the expected weight of the aeroplane at the point where the 2 engines are assumed to fail must not be less than that which would include sufficient fuel to meet the fuel requirements, for aeroplanes, stated in Chapter 3, Division 4.

52 Take-off weight—planned missed approach climb

(1) For an instrument approach procedure, stated in the AIP, with a missed approach gradient that is more than 2.5%, the aeroplane must not commence a take-off at a weight more than that which would allow, at the landing weight of the aeroplane determined in accordance with Division 5, a missed approach for the procedure to be carried out in the 1-engine inoperative missed approach configuration for the aeroplane.

(2) For an instrument approach procedure, stated in the AIP, with a decision height below 200 ft, the aeroplane must not commence a take-off at a weight more than that which would allow, at the landing weight of the aeroplane determined in accordance with Division 5, a missed approach:

(a) with a climb gradient of at least 2.5% or the climb gradient published in the AIP, whichever is greater; and

(b) for the procedure to be carried out in the 1-engine inoperative missed approach configuration for the aeroplane.

Division 5—Landing weights

53 Purpose of Division 5

The purpose of this Division is to prescribe:

(a) the circumstances in which a weight for an aeroplane for a flight must be calculated under paragraph 135.445(2)(a) of CASR; and

(b) the methods for calculating that weight under paragraph 135.445(2)(b) of CASR.

54 Dispatch landing weight—dry runway

(1) The aeroplane's landing weight at the estimated time of arrival at the destination aerodrome or alternate aerodrome, if any, for the flight must not be more than a weight that allows a full-stop landing at the aerodrome, from a distance that is 50 ft above the runway threshold:

(a) for a jet-engine aeroplane—within 60% of the landing distance available for the runway; or

(b) for a turbo-propeller, or piston-engine, aeroplane—within 70% of the landing distance available for the runway.

(2) CASA may, under regulation 135.030 of CASR, approve a variation of the requirement stated in subsection (1), subject to a risk assessment, submitted by the aeroplane's operator to CASA, which demonstrates an acceptable level of safety for the operation.

(3) The following are relevant factors for calculating the aeroplane's landing weight under subsection (1):

(a) a dry runway;

(b) the most favourable runway in still air;

(c) the runway expected to be used, taking into account the wind speed and direction, instrument approach procedure and terrain;

(d) the landing configuration;

(e) the wind direction;

(f) the consumption of fuel and oil;

(g) the aerodrome's elevation;

(h) the runway slope, if greater than +/- 1%;

(i) unless otherwise accounted for in the performance data stated in the aeroplane's flight manual, not more than 50% of the headwind, if any, and not less than 150% of the tailwind, if any.

55 Dispatch landing weight—wet or contaminated runway

(1) Subject to subsection (2), if an authorised weather report or forecast indicates that the runway at the planned destination aerodrome or alternate aerodrome, if any, for the flight, at the estimated time of arrival, may be wet, the landing distance available at the aerodrome must be at least 115% of the required landing distance determined under subsection 54(1).

(2) A landing distance on a wet runway shorter than that required under subsection (1), but not less than that required under subsection 54(1), may be used if the aeroplane's flight manual provides landing distance information for wet runways.

(3) Subject to subsection (4), if an authorised weather report or forecast indicates that the runway at the planned destination aerodrome or alternate aerodrome, if any, for the flight, at the estimated time of arrival, may be contaminated, the landing distance available at the aerodrome must be at least the greater of the following:

(a) the landing distance available at the aerodrome stated in subsection (1);

(b) 115% of the required landing distance determined in accordance with the requirements of the aeroplane's flight manual relating to operations on contaminated runways.

(4) A landing distance on a contaminated runway shorter than that required under subsection (3), but not less than that required under subsection 54(1), may be used if the aeroplane's flight manual provides landing distance information for contaminated runways.

56 In-flight landing distance

(1) During the flight and before landing, the pilot in command of the aeroplane must determine the landing distance required at the estimated time of landing the aeroplane at the destination aerodrome or alternate aerodrome, if any, for the flight.

(2) If the actual landing distance is available from the OEM for the aeroplane, and that landing distance is used for the purpose of calculating the landing distance required under subsection (1), the pilot in command must ensure that the landing distance available, at the aerodrome, is at least 115% of the landing distance required.

(3) When determining the landing distance required under subsection (1), the pilot in command must take into account the following matters:

(a) landing on the runway expected to be used, taking into account the wind speed and direction;

(b) the landing weight of the aeroplane at the estimated time of landing;

(d) the expected instrument approach procedure and terrain;

(e) the pressure altitude at the aerodrome;

(f) the runway surface conditions;

(g) the runway slope, if greater than +/- 1%;

(h) the wind direction at the estimated time of landing;

(i) the ground handling characteristics of the aeroplane;
(j) the landing configuration;
(k) the deceleration devices required to be used to land within the landing distance required.

(4) If the actual landing distance is not available from the OEM for the aeroplane, or is available but not used under subsection (2), the determination of the landing distance required under subsection (1) must be made in accordance with subsection 54(1).

(5) In this section:

actual landing distance means the landing distance required for the actual conditions, at the aerodrome, using the deceleration devices required to be used for the landing.

Chapter 6—Instruments, indicators, equipment and systems

Division 1—Interpretation

57 Definitions for Chapter 6

In this Chapter:

display includes indicate**.**

(E)TSO means ETSO or TSO.

GNSS means the global navigation satellite system installed in an aircraft, which continually computes the position of the aircraft by use of the GPS.

NAA means national aviation authority.

system: see section 58.

the Regulations means CAR and CASR.

unserviceable, in relation to a system, means the system is incapable of functioning in all respects as intended by its manufacturer.

58 Meaning of *system*

(1) In this Chapter, unless the contrary intention appears, ***system*** includes each of the following:
(a) an instrument, indicator or item of equipment;
(b) any combination of 1 or more instruments, indicators or items of equipment;
(c) any combination of 1 or more instruments, indicators and items of equipment.

(2) In this Chapter, unless the contrary intention appears, each of the following is taken to be a system:

(a) an instrument, indicator or item of equipment;

(b) any combination of 1 or more instruments, indicators or items of equipment;

(c) any combination of 1 or more instruments, indicators and items of equipment.

59 Reference to ICAO document

(1) In this Chapter, unless the contrary intention appears, a reference to an ICAO document, however described, is a reference to the document as in force or existing from time to time.

(2) In this Chapter, reference to a numbered ICAO Annex is a reference to the Annex of that number, as in force or existing from time to time, and as contained in the Chicago Convention.

(3) In this Chapter, reference to a numbered ICAO Manual is a reference to the Manual of that number, or subsequent version, as in force or existing from time to time and issued by ICAO.

(4) In this Chapter, reference to a numbered ICAO Circular is a reference to the Circular of that number, or subsequent version, as in force or existing from time to time and issued by ICAO.

(5) If a provision of this Chapter refers to an ICAO document, then, unless the contrary intention appears, the document, as in force or existing from time to time, is taken to be applied, adopted or incorporated by, into or for this manual of standards, as the case requires.

Note 1: Relevant ICAO documents for this MOS may be accessed by navigating from the following link: http://www.icao.int/publications/Pages/default.aspx.

Note 2: A reference to an ICAO document, including an ICAO Annex, which only occurs in a Note to a provision does not have the effect that the document is taken to be applied, adopted or incorporated for this manual of standards, unless the contrary intention appears. Such references in Notes are to documents which may be used as guidance or background information.

60 References to TSO or ETSO

(1) In this Chapter, unless the contrary intention appears, a reference to a particular TSO is a reference to the TSO, as in force or existing from time to time, even if the citation of the TSO in this MOS has an alphabetical version letter that is not the latest such version letter.

(2) In this Chapter, unless the contrary intention appears, a reference to a particular ETSO is a reference to the ETSO, as in force or existing from time to time, even if the citation of the ETSO in this MOS has an alphabetical version letter that is not the latest such version letter.

61 Approval of system

(1) Before a system is fitted to, or carried on, the aeroplane under Part 135 of CASR, it must have been approved by CASA under Part 21 of CASR.

(2) Subsection (1) does not apply to the following:
  (a) an item of equipment used to display the time;
  (b) an independent portable light, for example, a flashlight or torch;
  (c) a portable megaphone;
  (d) a child restraint system;
  (e) a sea anchor and other equipment for mooring;
  (f) a first-aid kit or medical kit;
  (g) survival equipment, including signalling devices.

(3) Before a foreign registered aircraft begins a flight in Australian airspace, any system fitted to, or carried on, the aircraft must have been approved by the NAA of the aircraft's State of Registry.

Division 2—Flight instruments, indicators, equipment and systems

Subdivision 1—Preliminary

62 Purpose of Division 2

This Division prescribes the matters for subregulation 135.510(1) of CASR.

Subdivision 2—Prescribed matters

63 VFR flight by day

(1) An aeroplane for a VFR flight by day must be fitted with 1 or more systems for measuring and displaying the following flight information for the aeroplane:
  (a) indicated airspeed;
  (b) pressure altitude;
  (c) magnetic heading;
  (d) time;
  (e) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number.

(2) An aeroplane for a VFR flight by day, for which 2 pilots are required under the Regulations or the aeroplane's flight manual, must be fitted with at least 1 additional system, independent of the corresponding system mentioned in subsection (1), for measuring and displaying the following flight information for the aeroplane:
  (a) indicated airspeed;
  (b) pressure altitude;
  (c) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number.

(3) For subsections (1) and (2), the system for measuring and displaying the flight information mentioned in column 1 of an item in the following table must meet the requirements mentioned in column 2 of the item.

Table System requirements — aeroplane for a VFR flight by day

Item	Flight information Column 1	Requirements Column 2
1	Pressure altitude	The system must: (a) have an adjustable datum scale calibrated in millibars or hectopascals; and (b) be calibrated in feet, except that, if a flight is conducted in a foreign country which measures flight levels or altitudes in metres, the system must be calibrated in metres, or fitted with a conversion placard or device.
2	Magnetic heading	The system must be: (a) a direct reading magnetic compass; or (b) a remote indicating compass and a standby direct reading magnetic compass.
3	Time	1. The system must display accurate time in hours, minutes, and seconds. 2. The system must be: (a) fitted to the aeroplane and visible to the pilot from the pilot's normal sitting position; or (b) worn by, or immediately accessible to, the pilot for the duration of the flight.

64 VFR flight at night

(1) An aeroplane for a VFR flight at night must be fitted with a system for measuring and displaying the following flight information for the aeroplane:

(a) indicated airspeed;
(b) pressure altitude;
(c) magnetic heading;
(d) time;
(e) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number.
(f) turn and slip;
(g) attitude;
(h) vertical speed;
(i) stabilised heading;
(j) outside air temperature;
(k) whether the supply of power to gyroscopic instruments, if any, is adequate.

(2) An aeroplane for a VFR flight at night, for which 2 pilots are required under the Regulations or the aeroplane's flight manual, must be fitted with at least 1 additional system, independent of the corresponding system mentioned in subsection (1), for measuring and displaying the following flight information for the aeroplane:

(a) indicated airspeed;

(b) pressure altitude;

(c) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number.

(d) turn and slip;

(f) attitude;

(g) vertical speed;

(h) stabilised heading.

(3) For subsections (1) and (2), the system for measuring and displaying the flight information mentioned in column 1 of an item in the following table must meet the requirements mentioned in column 2 of the item.

Table System requirements — aeroplane for a VFR flight at night

Item	**Flight information** Column 1	**Requirements** Column 2
1	Indicated airspeed	1. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 2. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports.
2	Pressure altitude	1. The system must: (a) have an adjustable datum scale calibrated in millibars or hectopascals; and (b) be calibrated in feet, except that, if a flight is conducted in a foreign country which measures flight levels or altitudes in metres, the system must be calibrated in metres, or fitted with a conversion placard or device.

Item	Flight information Column 1	Requirements Column 2
		2. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 3. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports.
3	Magnetic heading	The system must be: (a) a direct reading magnetic compass; or (b) a remote indicating compass and a standby direct reading magnetic compass.
4	Time	1. The system must display accurate time in hours, minutes, and seconds. 2. The system must be: (a) fitted to the aeroplane and visible to the pilot from the pilot's normal sitting position; or (b) worn by, or immediately accessible to, the pilot for the duration of the flight.
5	Turn and slip	1. The system must display turn and slip information, except when a second independent attitude indicating system is fitted, in which case only the display of slip information is required. 2. The system must have an alternate power supply in addition to its primary power supply: (a) unless the system has a source of power independent of the power operating other gyroscopic instruments; or (b) the aeroplane is fitted with a second attitude indicator system that has a source of power independent of the power operating other gyroscopic instruments.
6	Attitude	The system must have an alternate power supply in addition to its primary power supply: (a) unless the system has a source of power independent of the power operating other gyroscopic instruments; or

Item	Flight information Column 1	Requirements Column 2
		(b) the aeroplane is fitted with a second attitude indicator system that has a source of power independent of the power operating other gyroscopic instruments.
7	Vertical speed	1. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 2. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports.
8	Stabilised heading	The system must have an alternate power supply in addition to its primary power supply: (a) unless the system has a source of power independent of the power operating other gyroscopic instruments; or (b) the aeroplane is fitted with a second attitude indicator system that has a source of power independent of the power operating other gyroscopic instruments. Note: A gyro-magnetic type of remote indicating compass meets this requirement if it has a primary power supply and an alternate power supply.

65 IFR flight

(1) An aeroplane for an IFR flight must be fitted with a system for measuring and displaying the following flight information for the aeroplane:

(a) indicated airspeed;
(b) pressure altitude;
(c) magnetic heading;
(d) time;
(e) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number;
(f) turn and slip;
(g) attitude;
(h) vertical speed;
(i) stabilised heading;

(j) outside air temperature.

(k) whether the supply of power to gyroscopic instruments, if any, is adequate.

(2) An aeroplane for an IFR flight, for which 1 pilot is required under the Regulations or the aeroplane's flight manual, must be fitted with at least 1 additional system, independent of the corresponding system mentioned in subsection (1), for measuring and displaying the following flight information for the aeroplane:

(a) pressure altitude;

(b) attitude.

(3) An aeroplane for an IFR flight, for which 2 pilots are required under the Regulations or the aeroplane's flight manual, must be fitted with at least 1 additional system, independent of the corresponding system mentioned in subsection (1), for measuring and displaying the following flight information for the aeroplane:

(a) indicated airspeed;

(b) pressure altitude;

(c) Mach number, but only for an aeroplane with operating limitations expressed in terms of Mach number;

(d) turn and slip;

(e) vertical speed;

(f) stabilised heading.

(4) An aeroplane, for an IFR flight, which has a MTOW of more than 5 700 kg must be fitted with a standby attitude system.

(5) For subsections (1) to (3), the system for measuring and displaying the flight information mentioned in column 1 of an item in the following table must meet the requirements mentioned in column 2 of the item.

Table System requirements — aeroplane for an IFR flight

Item	**Flight information** Column 1	**Requirements** Column 2
1	Indicated airspeed	1. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 2. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and

Item	Flight information Column 1	Requirements Column 2
		(ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports. 3. At least 1 airspeed indicating system must include a means of preventing malfunction due to condensation or icing.
2	Pressure altitude	1. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 2. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports. 3. The system must: (a) have an adjustable datum scale calibrated in millibars or hectopascals; and (b) be calibrated in feet, except that, if a flight is conducted in a foreign country which measures flight levels or altitudes in metres, the system must be calibrated in metres or fitted with a conversion placard or device.
3	Magnetic heading	The system must be: (a) a direct reading magnetic compass; or (b) a remote indicating compass and a standby direct reading magnetic compass.
4	Time	1. The system must display accurate time in hours, minutes, and seconds. 2. The system must be: (a) fitted to the aeroplane and visible to the pilot from his or her normal sitting position; or (b) worn by, or immediately accessible to, the pilot for the duration of the flight.

Item	Flight information Column 1	Requirements Column 2
5	Turn and slip	1. The system must display turn and slip information, except where a second independent attitude indicating system is fitted, in which case only the display of slip information is required. 2. The system must have an alternate power supply in addition to its primary power supply.
6	Attitude	The system must have an alternate power supply in addition to its primary power supply.
7	Vertical speed	1. For an aeroplane that has a MTOW of not more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) a balanced pair of flush static ports. 2. For an aeroplane that has a MTOW of more than 5 700 kg, the system must be capable of being connected to: (a) an alternate static system that: (i) is selectable by a pilot; and (ii) includes a selector that can open or block the aeroplane's static source and alternative static source at the same time; or (b) two independent static sources, with each consisting of a balanced pair of flush static ports.
8	Stabilised heading	The system must have an alternate power supply in addition to its primary power supply. Note: A gyro-magnetic type of remote indicating compass meets this requirement if it has a primary power supply and an alternate power supply.
9	Standby attitude	The system must: (a) have a source of power independent of the electrical generating system; and (b) operate independently of other attitude systems; and (c) continue to operate, without any action by the flight crew, for a period of 30 minutes following the failure of the electrical generating system.

66 Equipment to measure and record cosmic radiation

(1) An aeroplane for a flight above flight level 490 must be fitted with a system to measure and display the cosmic radiation received in the aeroplane's cabin.

(2) For subsection (1), the system must continuously measure and display:
  (a) the dose rate of total cosmic radiation being received during the flight; and
  (b) the cumulative dose of total cosmic radiation received during the flight.

(3) In this section:

total cosmic radiation means the total of:

(a) ionising radiation of galactic and solar origin; and

(b) neutron radiation of galactic and solar origin.

Division 3—Flight recording equipment

67 Purpose of Division 3

This Division prescribes the matters for subregulation 135.535(2) of CASR.

68 Definitions for Division 3

In this Division:

APU means auxiliary power unit.

combination recorder means an item of equipment combining the capabilities and functions of a FDR and CVR.

CVR means cockpit voice recorder.

FDR means flight data recorder.

69 Flight data recorder

(1) One FDR must be fitted to a turbine-engine aeroplane that has a MTOW of more than 5 700 kg.

(2) One FDR must be fitted to an aeroplane that:

(a) has a MTOW of more than 5 700 kg; and

(b) was first issued with a certificate of airworthiness on or after 1 July 1965.

70 Cockpit voice recorder

(1) One CVR must be fitted to a turbine-engine aeroplane that has a MTOW of more than 5 700 kg.

(2) One CVR must be fitted to an aeroplane that:

(a) has a MTOW of more than 5 700 kg; and

(b) was first issued with a certificate of airworthiness on or after 1 July 1965.

71 Data link recording

RESERVED

72 Combination recorder

If an aeroplane is required, under this Division, to be fitted with both 1 FDR and, 1 CVR, the requirements may be met if the aeroplane is fitted with:

(a) 2 combination recorders; or

(b) 1 FDR and 1 combination recorder; or
(c) 1 CVR and 1 combination recorder.

73 Recorder technical requirements

(1) Each of the recorders fitted to an aeroplane under this Division must comply with Part I of ICAO Annex 6.

(2) A FDR, or combination recorder, fitted to an aeroplane under this Division, must be fitted with an acoustic underwater locating device that:
(a) has its own power source; and
(b) remains active for 30 days after the device enters water, ice melt or snow.

74 Unserviceable flight recording equipment

(1) A recorder fitted to the aeroplane under this Division may be unserviceable at the beginning of the flight if:
(a) the flight begins from the departure aerodrome, for the flight, with no facility for the recorder to be repaired or replaced; or
(b) the flight is a test flight or training flight; or
(c) for an aeroplane fitted with 1 CVR and 1 FDR under this Division:
(i) the unserviceable recorder has not been unserviceable for more than 21 days; and
(ii) the other recorder is serviceable.

(2) In this section:

CVR includes a combination recorder.

FDR includes a combination recorder.

75 Continuous operation of flight recorders

(1) A FDR fitted to an aeroplane under this Division must operate continuously from the time the aeroplane begins moving under its own power until the time the flight ends and the aeroplane can no longer move under its own power.

(2) Subject to subsections (3) and (4), a CVR fitted to an aeroplane under this Division must operate continuously during the period:
(a) beginning when the first pilot checklist commences before the engines are started for the flight; and
(b) ending when the final pilot checklist is completed at the end of the flight.

(3) Subsection (4) applies if:
(a) there is no APU, or other alternative power source, for the aeroplane; and
(b) it is reasonably necessary to preserve the aeroplane's primary power source in order to start the aeroplane's engines for a flight; and
(c) a FDR fitted to the aeroplane under this Division is operated continuously during the period beginning just before the engines are started for the flight

and ending when the final pilot checklist is completed at the end of the flight.

(4) Despite subsection (2), a CVR fitted to the aeroplane under this Division must operate continuously during the period:
   (a) beginning before the engines are started for the flight; and
   (b) ending when the final pilot checklist is completed at the end of the flight.

(5) In this section:

CVR includes a combination recorder.

FDR includes a combination recorder.

76 Flight data recorder or combination recorder not to be operated during aeroplane maintenance

(1) A FDR fitted to an aeroplane under this Division must not be operated during the maintenance of the aeroplane, or an aeronautical product fitted to the aeroplane, unless the maintenance is to the recorder or an engine.

(2) For subsection (1), an APU fitted to the aeroplane is not an engine, unless it is used to propel the aeroplane.

(3) In this section:

FDR includes a combination recorder.

Division 4—Ancillary or auxiliary equipment

Subdivision 1—Preliminary

77 Purpose of Division 4

This Division prescribes the matters for subregulation 135.540(1) of CASR.

Subdivision 2— Altitude alerting systems

78 Altitude alerting system and assigned altitude indicator – IFR flights

(1) The following aeroplanes must be fitted with an altitude alerting system if operating under the IFR:
   (a) a jet-powered aeroplane;
   (b) a pressurised turbine-engine aeroplane;
   (c) an unpressurised turbine-engine aeroplane, operating in controlled airspace above flight level 150;
   (d) a piston-engine aeroplane, operating in controlled airspace above flight level 150.

(2) For subsection (1), the altitude alerting system must:
   (a) include an assigned altitude indicator; and

(b) alert the flight crew, for the flight, if the aeroplane approaches a preselected altitude; and

(c) alert the flight crew, including by a sound signal, if the aeroplane deviates from a preselected altitude; and

(d) be readable and adjustable by each flight crew member from his or her normal sitting position in a pilot's seat in the aeroplane.

(3) If an aeroplane (a ***relevant aeroplane***), other than an aeroplane to which subsection (1) applies, is operating under the IFR in controlled airspace, the relevant aeroplane must be fitted with an assigned altitude indicator that is readable and adjustable by each flight crew member from his or her normal sitting position in a pilot's seat in the aeroplane.

(4) Subsection (3) does not apply if an altitude alerting system has been fitted to the aeroplane.

Subdivision 3— Automatic pilot systems

79 Automatic pilot system—prescribed matters

(1) An aeroplane flown by a single pilot for one of the following flights:

(a) an IFR flight;

(b) a VFR flight at night;

must be fitted with an automatic pilot system.

(2) An automatic pilot system fitted to an aeroplane under subsection (1) must have at least the following modes:

(a) an altitude-hold mode;

(b) a heading mode.

Subdivision 4— Airborne collision avoidance systems

80 Airborne collision avoidance system — ACAS II

An ACAS II must be fitted to a turbine-engine aeroplane that:

(a) has a MTOW of more than 5 700 kg; and

(b) was first issued with a certificate of airworthiness on or after 1 January 2014.

Subdivision 5 — Terrain awareness and warning systems

81 Terrain awareness and warning system — prescribed matters

(1) This section applies to an aeroplane, for an IFR flight or a VFR flight at night, which:

(a) has a MTOW of more than 5 700 kg; and

(b) is conducting a passenger transport operation or medical transport operation.

(2) If the aeroplane is a piston-engine aeroplane, it must be fitted with a TAWS-Class A or TAWS-Class B.

(3) If the aeroplane is a turbine-engine aeroplane, it must be fitted with a TAWS-Class A.

Note: Under subsection 2(2), this section commences 2 years after the commencement of section 2.

Subdivision 6 — Global navigation satellite systems

82 Definitions for Subdivision 6

In this Subdivision:

approved GNSS means:

(a) a GNSS that is authorised by CASA, or the NAA of a recognised country, in accordance with one of the following:

(i) (E)TSO-C129;

(ii) (E)TSO-C145;

(iii) (E)TSO-C146;

(iv) (E)TSO-C196a;

(b) a multi-sensor navigation system that:

(i) includes a GNSS and inertial integration; and

(ii) is approved in writing by CASA as providing a level of performance equivalent to a GNSS mentioned in paragraph (a).

Note: An approved GNSS authorised in accordance with (E)TSO-C129 is unlikely to satisfy the GNSS position source requirements for ADS-B surveillance.

DME means distance measuring equipment.

MSA, or ***minimum sector altitude***, means the lowest usable altitude that provides at least 300 m (or 1 000 ft) clearance above all objects within a sector of a circle of radius 46 km (or 25 nautical miles) centred on a significant point.

NDB means non-directional beacon.

RNAV means a method of navigation that permits aircraft operations on any desired flight path within:

(a) the coverage of ground-based, or space-based, navigation aids; or

(b) the limits of the capability of self-contained navigation aids; or

Note: Self-contained navigation aids are such aids on board an aircraft.

(c) a combination of paragraphs (a) and (b).

RNP means a statement of the navigation performance necessary for an aircraft operation within a defined airspace.

VOR means VHF omnidirectional radio range.

83 Flight under the IFR

An aeroplane for a flight under the IFR must be fitted with:

(a) a multi-sensor navigation system that:

(i) includes a GNSS and inertial integration; and

(ii) is approved in writing by CASA as providing a level of performance equivalent to an approved GNSS; or

(b) at least 2 approved GNSS; or

(c) an approved GNSS, and either an automatic direction finder (ADF) or a VOR navigation receiver.

84 Use of approved GNSS

(1) An aeroplane must use an approved GNSS as a navigation system for any of the following:

(a) an approved RNAV instrument approach procedure, including the related missed approach procedure;

(b) a RNAV standard instrument departure (SID) or RNAV standard instrument arrival (STAR).

(2) An aeroplane may use an approved GNSS as an RNAV system for any of the following:

(a) an oceanic, remote area, or domestic en route, phase of flight that is not an IFR flight;

(b) a VFR operation.

85 Use of suitable area navigation systems on conventional routes and procedures

(1) This section applies to a flight of an aeroplane if:

(a) a means is required for operating on, or transitioning to, conventional routes and procedures (other than RNAV or RNP); and

(b) the aeroplane's flight manual authorises navigation to RNP 2 (en route), RNP 1 or RNP AR (terminal and approach); and

(c) other applicable requirements of this Division are complied with.

(2) An approved GNSS may be used:

(a) as a substitute means of navigation if:

(i) a conventional navigation aid is not available; or

(ii) the aeroplane is not equipped with an ADF, VOR or DME; or

(iii) the installed ADF, VOR or DME is inoperative; or

(b) as an alternative means of navigation if:

(i) a conventional navigation aid is serviceable; and

(ii) the aeroplane is equipped with serviceable equipment that is compatible with the conventional navigation aids.

(3) For subsections (1) and (2), an approved GNSS may be used as a substitute for, or alternative to, any of the following conventional navigation aids:

(a) VOR;
(b) DME;
(c) VOR/DME;
(d) NDB;
(e) Outer Marker;
(f) Middle Marker.

(4) For subsections (1) and (2), before using an approved GNSS as a substitute for, or alternative to, any of the conventional navigation aids mentioned in subsection (3) for:

(a) terminal operations (SID or STAR); or
(b) approach operations phases of flight;

the pilot in command, for the flight, must verify that:

(c) the intended waypoints or procedures can be loaded from the navigation database by name; and
(d) latitude and longitude waypoints, manually-entered by a pilot, are not used; and
(e) the navigation system will fly the procedure as published in authorised aeronautical information; and
(f) RAIM or other approved integrity monitoring is available.

86 Restrictions on use of approved GNSS

For a flight of an aeroplane, an approved GNSS must not be used for the following:

(a) navigation using procedures that are advised by NOTAMS as not authorised for use;

Note: For example, the pilot in command, for the flight, may not use an approved GNSS to navigate on a procedure that is based on a recently decommissioned navigation aid.

(b) lateral navigation on localised-based courses (including localised back-course guidance) without reference to raw localised data.

87 Procedures for using approved GNSS for certain phases of flight

(1) The pilot in command of an en route aeroplane may use an approved GNSS with data that has been manually entered into a database, only if the data entries:

(a) for an operation with at least 2 pilots — have been cross-checked for accuracy by at least 2 flight crew members for the flight; or
(b) for a single pilot operation — have been checked independently against other aeronautical information.

Note: For example, other aeronautical information may be contained in authorised aeronautical information for the flight required under paragraph 91.120 (3) (a) of CASR.

(2) The pilot in command of an en route aeroplane must ensure that GNSS-derived position and tracking information obtained from manually entered data or supplied data is checked:

(a) at, or before, each reporting point published in the AIP or designated by ATS; and

(b) at, or before, each en route waypoint; and

(c) at hourly intervals during area navigation; and

(d) after the insertion of new data relating to the flight, such as a new flight plan or alteration of an existing flight plan.

(3) The pilot in command of an en route aeroplane may use an approved GNSS as a navigation aid for an oceanic, or remote area, phase of flight only if an appropriate en route prediction analysis conducted before the flight ensures that GNSS availability will provide a useable service.

(4) In this section:

en-route aeroplane means an aeroplane that is engaged in one of the following phases of flight:

(a) oceanic;

(b) remote area;

(c) domestic en route.

88 RNAV(GNSS) approach procedures

(1) If the pilot in command, for a flight, of an aeroplane is conducting an approach using RNAV(GNSS), the pilot in command:

(a) may only carry out a GNSS non-precision approach by using a current approved database with a GNSS non-precision approach procedure for the destination; and

(b) if carrying out a non-precision approach procedure or missed approach procedure — must not use an approved GNSS with data that has been manually entered.

(2) Subject to subsection (3), if the pilot in command, for a flight, of an aeroplane is carrying out a RNAV(GNSS) non-precision approach procedure that has passed the initial approach fix but has not arrived at the final approach fix, the pilot in command must carry out a missed approach procedure if there is:

(a) a RAIM warning or other reason to doubt the validity of GNSS-derived information; or

(b) RAIM loss.

(3) If a RAIM warning or RAIM loss ends before the pilot in command commences a missed approach procedure, the pilot in command may execute the missed approach using GPS-derived information.

(4) If there is reason to doubt the validity of GNSS-derived information, the pilot in command, for a flight, of an aeroplane must adopt procedures appropriate to loss of GNSS as a navigation aid.

(5) The pilot in command, for a flight, of an aeroplane may use an approved GNSS as a navigation aid for descent below the relevant LSALT or MSA in accordance with this section.

89 Use of approved GNSS in VFR operations

(1) An approved GNSS may be used under the VFR for the following:
  (a) to supplement map reading and other visual navigation techniques;
  (b) in operations at night — for:
    (i) position fixing and long-range navigation; or
    (ii) operations on designated PBN routes, including application of PBN-based LSALT;
    (iii) deriving distance information for en route navigation, traffic separation and ATS separation;
    (iv) meeting the night VFR requirements for radio navigation systems and alternate aerodrome requirements in this MOS.

Note: ATS may apply PBN-based separation standards to aeroplanes meeting the requirements for night VFR PBN.

(2) If an approved GNSS is used for night VFR PBN applications, the flight crew, for the flight, must be appropriately qualified for the night VFR PBN application.

(3) In this section:

PBN, or ***performance-based navigation***, means area navigation based on performance requirements for aeroplanes operating along an ATS route:
  (a) on an instrument approach procedure; or
  (b) in designated airspace.

Note: Performance requirements are expressed in navigation specifications (RNAV specification, and RNP specification) in terms of the accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular class of airspace.

90 Operating without RAIM on domestic en route phase of flight

(1) If there is RAIM loss or loss of integrity on a domestic en route phase of a flight of an aeroplane while using an approved GNSS, the pilot in command of the aeroplane must:
  (a) monitor the aeroplane's track by reference to the other navigation aids with which the aeroplane is equipped; or
  (b) carry out procedures for the loss of navigation equipment, as stated in one of the following:
    (i) the operator's exposition;
    (ii) the aeroplane's flight manual;
    (iii) the GNSS manufacturer's instructions;
    (iv) the RAIM loss or loss of integrity procedures published by CASA for this section.

(2) If the pilot in command of an aeroplane on a domestic en route phase of a flight is using an approved GNSS within a control area, the pilot in command must advise ATS if:

(a) there is RAIM loss or loss of integrity for more than 5 minutes; or

(b) RAIM or data integrity is not available when ATS requests the provision of GNSS-derived information; or

(c) RAIM or data integrity is not available when ATS grants a clearance, or imposes a requirement, based on GNSS-derived information; or

(d) the GNSS receiver is in dead reckoning mode, or experiences loss of its navigation function, for more than 1 minute; or

(e) the indicated displacement of the aeroplane from the centre line of its track is found to exceed 2 nautical miles.

(3) If:

(a) valid position information is lost, with the GNSS receiver being placed in 2-dimensional or dead reckoning mode; or

(b) there is RAIM loss for more than 5 minutes;

then the pilot in command must use another means of navigation until RAIM is restored and the aeroplane is re-established on track.

(4) If RAIM has been lost for more than 5 minutes, the pilot in command:

(a) must not use GNSS-derived information or supply it to ATS; and

(b) after RAIM is restored — must notify ATS before using or supplying RAIM information.

(5) After RAIM or data integrity is restored, the pilot in command must notify ATS of the restoration before GNSS-derived information is used.

(6) When advising ATS that RAIM has been lost for more than 5 minutes or of its subsequent restoration, the pilot in command must use the expression "RAIM failure" or "RAIM restored".

(7) If GNSS-derived information is supplied to ATS when RAIM has been unavailable for less than 5 minutes, the pilot in command must conclude the report with the expression "Negative RAIM".

91 Use and supply of GNSS-derived distance information

(1) This section applies if the pilot in command, for a flight, of an aeroplane is using an approved GNSS.

(2) If ATS asks for distance information without specifying the source of the information, the pilot in command may provide GNSS-derived distance information.

(3) If ATS asks for a DME distance, the pilot in command may provide GNSS-derived distance information if a DME distance is not available.

(4) When supplying GNSS-derived distance information to ATS, the pilot in command must include the source and point of reference.

Note: These are examples of source and the point of reference: *"115 GNSS ML VOR", "80 GNSS CTM NDB", "267 GNSS BEEZA"*.

(5) The pilot in command may only supply GNSS-derived distance information by reference to waypoints, navigation aids and other relevant data from a current approved database.

92 GNSS arrivals, and DME or GNSS arrivals

(1) The pilot in command, for a flight, of an aeroplane may use an approved GNSS in a GNSS arrival, or DME or GNSS arrival, only if:

(a) the coordinates of the destination VOR or NDB to which the procedure relates are obtained from a current approved database; and

(b) RAIM or data integrity is available at the time of descending below the applicable LSALT or MSA.

(2) During a DME or GNSS arrival, the pilot in command, for a flight, of an aeroplane must:

(a) use the destination VOR or NDB to provide the primary track guidance; and

(b) if there is a significant disparity between the track guidance provided by the destination VOR or NDB and the GNSS track indication — discontinue the arrival procedure.

(3) The pilot in command, for a flight, of an aeroplane must immediately conduct a missed approach if, at any time during the approach:

(a) there is doubt as to the validity of the GNSS information, for example, RAIM warning; or

(b) GNSS integrity is lost, for example, RAIM not available.

(4) For the purposes of paragraph (2) (b), a significant disparity is:

(a) for a NDB — a divergence of more than 6.9º; and

(b) for a VOR — a divergence of more than 5.2º.

(5) The pilot in command, for a flight, of an aeroplane may use an approved GNSS as a navigation aid for descent below the relevant LSALT or MSA in accordance with this section.

93 Use of GNSS instead of DME

(1) An approved GNSS may be used instead of DME for instrument approaches for which DME is required, but only if:

(a) the substituted DME reference position can be selected from the database; and

(b) the reference position used is annotated on the approach chart.

(2) The pilot in command, for a flight, of an aeroplane may use an approved GNSS as a navigation aid for descent below the relevant LSALT or MSA in accordance with this section.

Subdivision 7 — Aeronautical databases

94 Application of Subdivision

This Subdivision applies to a flight of an aeroplane if it is fitted with a computerised navigation system, the database of which may be used by a pilot for a flight of the aeroplane.

95 Computerised navigation systems — databases

(1) The data in the computerised navigation system's database must be:
   (a) current for the flight; and
   (b) in a form that ensures the navigational information within the database cannot be changed by the aeroplane's operator or a pilot for the flight; and
   (c) for an Australian registered aircraft — supplied by a data service provider authorised for that purpose under Part 175 of CASR.

(2) Updating of the computerised navigation system's database must be carried out in accordance with the instructions issued by the system's manufacturer.

(3) Without limiting subsection (2), the database may be updated by a pilot for a flight only if the pilot is:
   (a) qualified under Part 61 of CASR to fly the aeroplane using the system; and
   (b) authorised in writing by the aeroplane's operator to update the system.

96 Computerised navigation systems — requirements

(1) This section applies if the computerised navigation system is used for one of the following flights:
   (a) an IFR flight;
   (b) a VFR flight at night.

(2) For subsection (1):
   (a) the system must be operated in accordance with instructions issued by the system's manufacturer; and
   (b) any data that is manually entered into the system must be checked against published navigational data.

97 Computerised navigation systems — additional requirements for 2-pilot operations

(1) This section applies if:
   (a) the computerised navigation system is used for an IFR flight or a VFR flight at night; and
   (b) the aeroplane is flown by 2 pilots as required under the Regulations or the aeroplane's flight manual.

(2) Any data that is manually entered into the system by one of the pilots must be checked against published navigational data by the other pilot.

Subdivision 8 — Radio communication equipment

98 Aeroplanes to be fitted with radio communication equipment

(1) This section applies to an aeroplane for a flight for which radio communication equipment must be fitted in accordance with the following table (the ***table***).

(2) The aeroplane in the operation mentioned in column 1 of an item in the table, in the class of airspace mentioned in column 2 of the item, must be fitted with radio communication systems that meet the requirements mentioned in column 3 of the item.

(3) At least one of the radio communication equipment systems required to be fitted to the aeroplane under subsection (2) must be capable of continuous communication with ATS on all frequencies necessary to meet reporting, broadcast and listening watch requirements.

Table Radio communication equipment — requirements

Item	**Operation** Column 1	**Class of airspace** Column 2	**Requirements** Column 3
1	IFR	Any Class (Class A, B, C, D, E or G)	1. The aeroplane must be fitted with: (a) 2 VHF radio communication systems; or (b) 1 VHF radio communication system and 1 HF radio communication system. 2. A HF radio communication system fitted to the aeroplane must only be used for communication with ATS when beyond the range of VHF communication.
2	VFR at night	Any Class (Classes A, B, C, D, E or G)	1. The aeroplane must be fitted with: (a) 2 VHF radio communication systems; or (b) 1 VHF radio communication system and 1 HF radio communication system. 2. A HF radio communication system fitted to the aeroplane must only be used for communication with ATS when beyond the range of VHF communication.

Item	Operation Column 1	Class of airspace Column 2	Requirements Column 3
3	VFR	Any Class (Classes A, B, C, D, E or G)	1. The aeroplane must be fitted with: (a) 1 VHF radio communication system; or (b) 1 VHF radio communication system and 1 HF radio communication system. 2. A HF radio communication system fitted to the aeroplane must only be used for communication with ATS when beyond the range of VHF communication.

Subdivision 9 – Transponders and surveillance equipment

99 Definitions for Subdivision 9

In this Subdivision:

ADS-B means automatic dependent surveillance – broadcast.

ADS-B OUT means the capability of an aircraft or vehicle to periodically broadcast position and other information for surveillance purposes.

aircraft address means the unique 24-bit binary code available for assignment to an aircraft for the purposes of air-ground communications, navigation and surveillance.

approved GNSS position source means a GNSS position source that is:

(a) authorised by FAA or EASA in accordance with one of the following:
  (i) (E)TSO-C145a;
  (ii) (E)TSO-C146a;
  (iii) (E)TSO-C196a; or
(b) an alternate GNSS position source meeting the requirements mentioned in section 103; or
(c) another system, approved in writing by CASA as having a level of performance equivalent to performance in accordance with paragraph (a) or (b).

approved Mode A/C transponder means a Mode A or Mode C transponder authorised:

(a) by CASA, or the NAA of a recognised country, in accordance with (E)TSO-C74a; or
(b) by CASA in accordance with ATSO-1C74c.

approved Mode S transponder means a Mode S transponder that is:

(a) authorised by CASA, or the NAA of a recognised country, in accordance with:

(i) (E)TSO-C112; and

(ii) (E)TSO-C166b; or

(b) another system, approved in writing by CASA as having a level of performance equivalent to a system mentioned in paragraph (a).

Note: CASA Advisory Circular 21-46 provides guidelines on Mode S transponder equipment.

approved Mode S transponder with ADS-B OUT means an equipment configuration capable of ADS-B out operation on the ground and in flight, and that is one of the following:

(a) an approved Mode S transponder connected to an approved GNSS position source;

(b) an alternate ADS-B OUT equipment configuration meeting the requirements mentioned in section 104;

(c) another system approved in writing by CASA as having a level of performance equivalent to a system mentioned in paragraphs (a) or (b).

approved transponder means an approved Mode A/C transponder or an approved Mode S transponder.

ASAO means approved self-administering aviation organisation.

assigned aircraft address means an aircraft address that is assigned to an aircraft by:

(a) if the aircraft is registered on the Australian Civil Aircraft Register — CASA; or

(b) if the aircraft is placed on an ASAO's aircraft register — the ASAO; or

(c) if the aircraft is a foreign registered aircraft — the NAA of the country of registration.

ATC means air traffic control.

DAPs means Mode S EHS downlink aircraft parameters.

EASA AMC 20-24 means Annex II to ED Decision 2008/004/R titled *Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter*, dated 2 May 2008, of EASA.

EASA CS-ACNS means Annex I to ED Decision 2013/031/R titled *Certification Specifications and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance (CS-ACNS)*, dated 17 December 2013, of EASA.

FDE means Fault Detection and Exclusion, a feature of a GNSS receiver that excludes faulty satellites from position computation.

HPL means the Horizontal Protection Level of the GNSS position of an aircraft as an output of the GNSS receiver or system.

Mode A is a transponder function that transmits a 4-digit octal code for an aircraft's identity when interrogated by an SSR.

Mode A code is the 4-digit octal identification code transmitted by a Mode A transponder function.

Mode C is a transponder function that transmits a 4-digit octal code for an aircraft's pressure altitude when interrogated by an SSR.

Mode S is a transponder function that uses a unique aircraft address to selectively call individual aircraft. It supports advanced surveillance using Mode S EHS, Mode S ELS, or Mode S ES capabilities.

Mode S EHS means Mode S enhanced surveillance, which is a data transmission capability of a Mode S transponder.

Mode S ELS means Mode S elementary surveillance, which is a data transmission capability of a Mode S transponder.

Mode S ES means Mode S extended squitter, which is a data transmission capability of a Mode S transponder used to transmit ADS-B OUT information.

NACp means Navigation Accuracy Category – Position as specified in paragraph 2.4.3.2.7.2.7 of RTCA/DO-260B.

NIC means Navigation Integrity Category as specified in paragraph 2.2.3.2.7.2.6 of RTCA/DO-260A.

NUCp means Navigation Uncertainty Category – Position as specified in paragraph 2.2.8.1.5 of RTCA/DO-260.

RTCA/DO-229D means document RTCA/DO-229D titled *Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment*, dated 13 December 2006, of the RTCA Inc. of Washington D.C. USA (***RTCA Inc.***).

RTCA/DO-260 means RTCA Inc. document RTCA/DO-260 titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast*, dated 13 September 2000.

RTCA/DO-260B means RTCA Inc. document RTCA/DO-260B titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)*, dated 2 December 2009.

SA means Selective Availability, and is a function of the GPS that has the effect of degrading the accuracy of the computed GPS position of a GNSS-equipped aircraft.

surveillance radar means radar equipment used by ATC to determine the position of an aircraft.

secondary surveillance radar (SSR) means a surveillance radar system that is used to interrogate aircraft equipped with transponders.

SIL means Source Integrity Level as specified in paragraph 2.2.3.2.7.2.9 of RTCA/DO-260B.

transponder means an aircraft's secondary surveillance radar (SSR) transponder.

100 Transponder and surveillance equipment to be fitted

(1) This section applies to an aeroplane for a flight for which transponder and surveillance equipment must be fitted in accordance with the following table (the ***table***).

(2) The aeroplane in the operation mentioned in column 1 of an item in the table, in the class of airspace mentioned in column 2 of the item, must be fitted with transponder and surveillance equipment meeting the requirements mentioned in column 3 of the item.

Table Transponder and surveillance equipment — requirements

Item	Operation Column 1	Class of airspace Column 2	Requirements Column 3
1	IFR	Any Class (Class A, B, C, D, E or G)	At least 1 approved Mode S transponder with ADS-B OUT.
2	Any (IFR or VFR)	Class C — at certain aerodromes	For an aeroplane operating at one of the following aerodromes: (a) Brisbane (YBBN); (b) Sydney (YSSY); (c) Melbourne (YMML); (d) Perth (YPPH); — at least 1 approved Mode S transponder. Note: An approved Mode S transponder fitted to an aeroplane is required to be ADS-B capable, but ADS-B transmission is not required for VFR flight.
3	VFR	Class A, B, C or E	(a) For an aeroplane first issued with a certificate of airworthiness on or after 6 February 2014, or modified by having its transponder replaced on or after 6 February 2014 — at least 1 approved Mode S transponder; or (b) for any other aeroplanes — at least 1 approved transponder. Note: An approved Mode S transponder fitted to an aeroplane is required to be

Item	Operation Column 1	Class of airspace Column 2	Requirements Column 3
			ADS-B capable, but ADS-B transmission is not required for VFR flight.
4	VFR	Class G — from 10 000 ft and above	(a) For an aeroplane first issued with a certificate of airworthiness on or after 6 February 2014, or modified by having its transponder replaced on or after 6 February 2014 — at least 1 approved Mode S transponder; or (b) for any other aeroplanes — at least 1 approved transponder. Note: An approved Mode S transponder fitted to an aeroplane is required to be ADS-B capable, but ADS-B transmission is not required for VFR flight.
5	VFR	Class A — from flight level 290 and above	(a) For an aeroplane first issued with a certificate of airworthiness on or after 6 February 2014, or modified by having its transponder replaced on or after 6 February 2014 — at least 1 approved Mode S transponder with ADS-B OUT; or (b) for any other aeroplanes — at least 1 approved transponder.

101 Operation of transponders — general requirements

(1) Subject to subsections (2) to (4), if an approved transponder is fitted to an aeroplane for a flight, it must be operated at all times.

(2) An aeroplane is not required to operate a transponder if ATC issues an instruction that the transponder is not to be operated.

(3) An aeroplane for a flight in formation with other aeroplanes is not required to operate a transponder if an approved transponder is operated by another aeroplane in the formation.

(4) If an aeroplane is fitted with more than 1 approved transponder, only 1 transponder is to be operated at any time.

(5) If an approved transponder is fitted to an aeroplane for a flight, the Mode A code must be set:

(a) to the transponder code assigned by ATC for the flight; or

(b) if no transponder code is so assigned — to the relevant standard code in the following table (the ***table***).

(6) For paragraph (5) (b), for the situation mentioned in column 1 of an item in the table, the Mode A code is the number mentioned in column 2 of the item.

(7) If an approved transponder capable of reporting pressure altitude is fitted to an aeroplane for a flight, it must be operated with altitude reporting enabled.

(8) Pressure altitude information reported by an approved transponder must be determined by a barometric encoder of a kind authorised by CASA, or the NAA of a recognised country, in accordance with (E)TSO-C88.

Table Transponders — Mode A standard codes

Item	**Situation** Column 1	**Mode A Code** Column 2
1	(a) Flights in Class A, C or D airspace. (b) IFR flights in Class E airspace.	3000
2	IFR flights in Class G airspace.	2000
3	VFR flights in Class E or Class G airspace	1200
4	Flights in Class G over water at a distance more than 15 nautical miles from shore.	4000
5	Flights engaged in coastal surveillance.	7615
6	Ground testing by aircraft maintenance staff	2100
7	Unlawful interference	7500
8	Loss of radio communication	7600
9	In flight emergency (unless otherwise instructed by ATC).	7700

102 Mode S transponders – specific requirements

(1) An approved Mode S transponder fitted to an aeroplane for a flight must be configured as follows:

(a) the assigned aircraft address must be entered into the equipment;

(b) as far as practicable for the equipment —one of the following forms of aircraft flight identification must be entered into the equipment:

(i) if a flight notification is filed with ATC for the flight — the aircraft identification mentioned on the flight notification;

(ii) if no flight notification is filed with ATC for the flight — the aircraft registration mark or ASAO identifier, as applicable.

(2) An approved Mode S transponder with ADS-B OUT fitted to an aeroplane for a flight must be configured as follows:

(a) the assigned aircraft address must be entered into the equipment;

(b) one of the following forms of aircraft flight identification must be entered into the equipment:

(i) if a flight notification is filed with ATC for the flight — the aircraft identification mentioned on the flight notification;

(ii) if no flight notification is filed with ATC for the flight — the aircraft registration mark or ASAO identifier, as applicable.

(3) An approved Mode S transponder must transmit each of the following when interrogated on the manoeuvring area of an aerodrome or in-flight:

(a) the assigned aeroplane address;

(b) the Mode A code;

(c) the Mode C code;

(d) subject to subsection (4), the aircraft flight identification.

(4) Transmission of the aircraft flight identification by an approved Mode S transponder is optional for an aeroplane that was first issued with a certificate of airworthiness before 9 February 2012.

(5) If the approved Mode S transponder transmits any Mode S EHS DAPs, the transmitted DAPs must comply with the standards stated in paragraph 3.1.2.10.5.2.3 and Table 3-10 of Volume IV, Surveillance and Collision Avoidance Systems, of ICAO Annex 10.

Note 1: Paragraph 3.1.2.10.5.2.3 includes 3.1.2.10.5.2.3.1, 3.1.2.10.5.2.3.2 and 3.1.2.10.5.2.3.3.

Note 2: Australian Mode S SSR are EHS DAPs-capable, and operational use of EHS DAPs is to be introduced in Australia. Implementation of Mode S EHS DAPs transmissions that are not in accordance with the ICAO standards may be misleading to ATC. Operators need to ensure that correct parameters are being transmitted.

(6) If an approved Mode S transponder is fitted to an aeroplane, first issued with a certificate of airworthiness on or after 9 February 2012, and that:

(a) has a certificated MTOW of more than 5 700 kg; or

(b) is capable of normal operation at a maximum cruising true air speed above 250 knots;

the transponder's receiving and transmitting antennae must:

(c) be located in the upper and lower fuselage; and

(d) operate in diversity, as specified in paragraphs 3.1.2.10.4 to 3.1.2.10.4.5 (inclusive) of Volume IV, Surveillance and Collision Avoidance Systems, of ICAO Annex 10.

Note: Paragraph 3.1.2.10.4.2.1 is recommendatory only.

(7) Subject to subsection (8), an aeroplane must not fly in Australian territory if it is fitted with Mode S transponder equipment, other than an approved Mode S transponder with ADS-B OUT, unless the equipment is:

(a) deactivated; or

(b) set to transmit only a value of zero for the NUCp, NACp, NIC or SIL.

Note: It is considered equivalent to deactivation if NUCp, NACp, NIC or SIL is set to continually transmit only a value of zero.

(8) Subsection (7) does not apply to an aeroplane if it is undertaking an ADS-B test flight in VMC in airspace below flight level 290.

103 Alternate GNSS position source for ADS-B OUT — requirements

(1) For an aeroplane manufactured on or after 8 December 2016, an alternate GNSS position source is acceptable if the source:

(a) is certified by the NAA of a recognised country for use in IFR flight; and

(b) has included in its specification and operation the following:

(i) FDE, computed in accordance with the definition at paragraph 1.7.3 of RTCA/DO-229D;

(ii) the output function HPL, computed in accordance with the definition at paragraph 1.7.2 of RTCA/DO-229D;

(iii) functionality that, for the purpose of HPL computation, accounts for the absence of the SA of the GPS in accordance with paragraph 1.8.1.1 of RTCA/DO-229D.

(2) For an aeroplane manufactured before 8 December 2016, an alternate GNSS position source is acceptable if it meets the requirements of subsection (1), other than subparagraph (1) (b) (iii), which is optional.

104 Alternate ADS-B OUT equipment configuration — requirements

(1) For an aeroplane first issued with a certificate of airworthiness on or after 8 December 2016, an alternate ADS-B OUT equipment configuration is acceptable if:

(a) it has been certified by the NAA of a recognised country as meeting the standards of EASA AMC 20-24 or EASA CS-ACNS; and

(b) the aeroplane's flight manual attests to the certification; and

(c) the GNSS system meets the performance requirements mentioned in subsection 103 (1).

(2) For an aeroplane first issued with a certificate of airworthiness before 8 December 2016, an alternate ADS-B OUT equipment configuration is acceptable if:

(a) it has been certified by the NAA of a recognised country as meeting the standards of EASA AMC 20-24; and

(b) the aeroplane's flight manual attests to the certification;

(c) the GNSS system meets the performance requirements mentioned in subsection 103 (2).

(3) For an aeroplane first issued with a certificate of airworthiness on or after 8 December 2016, an alternate ADS-B OUT equipment configuration is acceptable if:

(a) it has been certified by the NAA of a recognised country as meeting the equipment standards of 14 CFR 91.227; and

(b) the aeroplane's flight manual attests to the certification; and

(c) the GNSS system meets the performance requirements mentioned in subsection 103 (1).

(4) For an aeroplane first issued with a certificate of airworthiness before 8 December 2016, an alternate ADS-B OUT equipment configuration is acceptable if:

(a) it has been certified by the NAA of a recognised country as meeting the equipment standards of 14 CFR 91.227; and
(b) the aeroplane's flight manual attests to the certification; and
(c) the GNSS system meets the performance requirements mentioned in subsection 103 (2).

Subdivision 10 – Airborne weather radar equipment

105 Airborne weather radar equipment prescribed matters

(1) This section applies to a relevant aeroplane, for an IFR flight or a VFR flight at night, which is which is conducting a passenger transport operation or medical transport operation.

(2) The aeroplane must be fitted with airborne weather radar equipment.

(3) In this section:

relevant aeroplane means:
(a) a pressurised turbine-engine aeroplane; or
(b) a pressurised piston-engine aeroplane with a MTOW of more than 5 700 kg, which is required under the Regulations, or the aeroplane's flight manual, to be flown by 2 or more pilots.

Division 5—Aeroplane lighting

106 Purpose of Division 5

This Division prescribes the matters for subregulation 135.600(1) of CASR.

107 Aeroplane lighting systems — VFR flight at night and IFR flight

(1) An aeroplane for a VFR flight at night, or an IFR flight, must be fitted with, or carry, the following lighting systems:
(a) cockpit lighting that meets the requirements mentioned in subsection (2);
(b) cabin lighting that enables each occupant of the aeroplane to see and use:
(i) his or her seatbelt and oxygen facilities, if any; and
(ii) the normal and emergency exits;
(c) for each crew member for the flight — an independent portable light accessible to the crew member from his or her normal sitting position in a crew member's seat in the aeroplane;
(d) anti-collision lights;
(e) navigation lights;
(f) at least 2 landing lights, or a single landing light with two independent illumination sources.
Note: See Part 90 of CASR for requirements relating to emergency lighting.

(2) The lighting from a cockpit lighting system must:
(a) illuminate each system that may be used by the flight crew; and

(b) illuminate the documents that may be used by the flight crew, including checklists and flight documents; and

(c) be compatible with each instrument or item of equipment that may be used by a pilot for the flight; and

(d) be arranged in a way that:

(i) enables all placards and instrument markings to be read from each pilot's normal sitting position in a pilot's seat in the aeroplane; and

(ii) each pilot's eyes are shielded from direct and reflected light; and

(e) be adjustable, so that the intensity of the lighting can be varied for the light conditions.

108 Anti-collision lights—display

(1) An anti-collision light system fitted to an aeroplane, for a flight, under section 107 must comprise:

(a) at least 1 red beacon light; or

(b) at least 2 white strobe lights; or

(c) a combination of the lights mentioned in paragraphs (a) and (b).

(2) For an anti-collision light system comprising red beacon lights only, the lights must be displayed as follows:

(a) for a turbine-engine aeroplane — from immediately before the engines are started until the time the engines are shut down at the end of the flight;

(b) for any other aeroplanes — from immediately after the engines are started until the time the engines are shut down at the end of the flight.

(3) For an anti-collision light system comprising white strobe lights only, the lights must be displayed as follows:

(a) for a turbine-engine aeroplane — from immediately before the engines are started until the time the engines are shut down at the end of the flight;

(b) for any other aeroplanes — from immediately after the engines are started until the time the engines are shut down at the end of the flight.

(4) For an anti-collision light system comprising a combination of red beacon lights and white strobe lights, the lights must be displayed as follows:

(a) for the red beacon lights — in accordance with the requirements mentioned in subsection (2);

(b) for the white strobe lights — despite subsection (3), in accordance with the following:

(i) if the aeroplane, on its way to the runway from which it will take off, or on its way from the runway on which it has landed, crosses any other runway that is in use for take-offs or landings (an active runway) — while the aeroplane is crossing the active runway;

(ii) from the time the aeroplane first enters the runway from which the aeroplane will take off until the time the aeroplane leaves the runway on which it has landed.

(5) Subsections (2), (3) and (4) do not apply if:

(a) the anti-collision light system was serviceable at the beginning of the flight but becomes unserviceable during the flight; or

(b) the pilot in command, for the flight, reasonably believes that, in the circumstances, reflection or glare from the anti-collision light system may cause a hazard to another aircraft.

109 Navigation lights—display

A navigation light system fitted to an aeroplane, for a flight, under section 107 must be displayed at night, or in poor visibility, whether the aeroplane is in the air or on the movement area of an aerodrome.

Division 6—In-flight communication systems

110 Purpose of Division 6

This Division prescribes the matters for subregulation 135.610(1) of CASR.

111 Flight crew intercommunication system

(1) An aeroplane, for a flight, must be fitted with a flight crew intercommunication system that:

(a) consists of 1 headset, and 1 microphone that is not of the hand-held type, for each pilot for the flight; and

(b) is accessible to each pilot in his or her normal sitting position in a pilot's seat in the aeroplane.

(2) Also, when an aeroplane begins a flight with 1 pilot, as required by the aeroplane's flight manual, it must also be fitted with:

(a) another headset, another microphone that is not of the hand-held type; or

(b) 1 microphone that is of the hand-held type, and 1 speaker.

(3) Also, when an aeroplane begins a flight with 2 pilots, as required under the Regulations, or the aeroplane's flight manual, it must be fitted with, or carry, another headset, and another microphone that is not of the hand-held type.

Division 7—Oxygen equipment and supplies

Subdivision 1—Pressurised aeroplanes

112 Application of Subdivision 1

This Subdivision applies to a pressurised aeroplane.

113 Supplemental oxygen equipment

(1) This section applies if the aeroplane's altitude will exceed 10 000 ft during the flight.

(2) For paragraph 135.620(1)(a) of CASR, supplemental oxygen equipment, which is capable of dispensing the amount of supplemental oxygen required for the flight by this Subdivision, is prescribed.

114 Requirements for passenger's supplemental oxygen equipment

(1) This section prescribes, for paragraph 135.620(1)(d) of CASR, the requirements relating to supplemental oxygen equipment required to be fitted to, or carried on, the aeroplane for the flight.

Aeroplanes first registered on or after 9 November 1998

(2) Subsection (3) applies:
   (a) to an aeroplane is first registered, in Australia or elsewhere, on or after 9 November 1998; and
   (b) if, during the flight:
      (i) the aeroplane is flown above flight level 250; or
      (ii) the aeroplane is flown at or below flight level 250, and the aeroplane cannot safely descend to flight level 130 within 4 minutes.

(3) The requirements prescribed are the following:
   (a) the equipment must deploy automatically;
   (b) the equipment must be immediately available to each passenger on the flight, wherever seated;
   (c) the equipment must have at least 10% more dispensing units (the ***extra units***) than the number of passenger seats on the aeroplane;
   (d) the extra units must be evenly distributed throughout the aeroplane's passenger compartments.

Aeroplanes first registered before 9 November 1998

(4) Subsection (5) applies if the aeroplane is first registered, in Australia or elsewhere, before 9 November 1998.

(5) The requirements prescribed are the following:
   (a) the equipment must have a dispensing unit that is immediately available to each passenger on the flight, wherever seated;
   (b) the equipment must have at least 10% more dispensing units (the ***extra units***) than the number of passenger seats on the aeroplane; and
   (c) the extra units must be evenly distributed throughout the aeroplane's passenger compartments.

115 Occupants of pilot seats

(1) This section applies if an aeroplane begins a flight during which the aeroplane's cabin pressure altitude will exceed 10 000 ft.

(2) For paragraph 135.620(1)(b) of CASR, the amount of supplemental oxygen prescribed is an amount that is sufficient to supply each person mentioned in subsection (3) for the period of the flight mentioned in subsection (4).

(3) For subsection (2), the persons are:

(a) each pilot who is in a pilot seat; and

(b) each other person:

(i) who is in a pilot seat; and

(ii) whose supplemental oxygen is provided from the flight crew's supplemental oxygen supply.

(4) For subsection (2), the period is the greater of the following:

(a) 30 minutes;

(b) the period while the aeroplane's cabin pressure altitude exceeds 10 000 ft.

Note: The oxygen supply for the protective breathing equipment for a flight crew member at his or her flight control seat may be from, and is not additional to, the amount of the aeroplane's supplemental oxygen supply required for the flight under this section: see subsection 119(3).

116 Passengers

(1) This section applies to a flight of an aeroplane to which an item mentioned in column 1 of the following table (the ***table***) applies.

Table Pressurised aeroplanes—amount of supplemental oxygen for passengers

Item	Column 1	Column 2	Column 3
	If, during the flight …	**the aeroplane must carry sufficient supplemental oxygen to supply the following percentage of passengers …**	**for the following period …**
1	the aeroplane's cabin pressure altitude exceeds flight level 150	100%	the greater of the following: (a) 10 minutes; (b) the period while the aeroplane's cabin pressure altitude exceeds flight level 150
2	the aeroplane's cabin pressure altitude exceeds flight level 140 but does not exceed flight level 150	30%	the period while the aeroplane's cabin pressure altitude exceeds flight level 140
3	both: (a) the aeroplane's cabin pressure altitude exceeds 10 000 ft for more than 30 minutes (the ***first 30 minutes***); and (b) the aeroplane's cabin pressure	10%	the period, after the first 30 minutes, while the aeroplane's cabin pressure altitude exceeds 10 000 ft

Table Pressurised aeroplanes—amount of supplemental oxygen for passengers			
Item	**Column 1**	**Column 2**	**Column 3**
	If, during the flight …	**the aeroplane must carry sufficient supplemental oxygen to supply the following percentage of passengers …**	**for the following period …**
	altitude does not exceed flight level 140		

(2) Subsection (3) applies to a flight of an aeroplane, other than a flight mentioned in subsection (4).

(3) For paragraph 135.620(1)(b) of CASR, the amount of supplemental oxygen prescribed, for the segment of the flight mentioned in column 1 of an item in the table, is an amount sufficient to supply the percentage of the passengers, for the flight, mentioned in column 2 of the item for the period of the flight mentioned in column 3 of the item.

(4) Subsection (5) applies to a flight of an aeroplane if:

(a) during the flight, the aeroplane will be flown above flight level 130 but not above flight level 250; and

(b) at all points along the route of the flight, the aeroplane will be able to:

(i) descend safely to flight level 130 within 4 minutes; and

(ii) complete the planned flight or land at an aerodrome that is suitable for the aeroplane to land at.

(5) For paragraph 135.620(1)(b) of CASR, the amount of supplemental oxygen prescribed is:

(a) for the segment of the flight mentioned in column 1 of an item in the table—an amount sufficient to supply the percentage of the passengers, for the flight, mentioned in column 2 of the item for the period of the flight mentioned in column 3 of the item; or

(b) an amount sufficient to supply 10% of the passengers for the flight for the period while the aeroplane's cabin pressure altitude exceeds 10 000 ft but does not exceed flight level 130.

(6) In this section:

passenger:

(a) includes a pilot who is not in a pilot seat; but

(b) does not include a person who is in a pilot seat and whose supplemental oxygen is provided from the flight crew's supplemental oxygen supply.

117 First-aid oxygen

(1) This section applies if:

(a) a flight of an aeroplane is a passenger transport operation; and
(b) the aeroplane is required under the Regulations, or the aeroplane's flight manual, to be flown by at least 2 pilots; and
(c) during the flight, the aeroplane will be flown above flight level 250.

(2) For subregulation 135.620(1) of CASR, it is prescribed that the aeroplane must carry the following for the flight:
(a) a volume of undiluted oxygen, for use in first aid if the cabin depressurises, that is at least the volume mentioned in subsection (3);
(b) at least 2 oxygen masks that are suitable for use in dispensing that oxygen;
(c) equipment for dispensing that oxygen that meets the requirement mentioned in subsection (4).

(3) For paragraph (2)(a), the volume is the volume that will provide an average oxygen gas flow rate, calculated assuming dry oxygen gas at standard temperature and pressure, of 3 litres per minute per person:
(a) for the greater of:
(i) 2% of the number of passengers carried on the flight; and
(ii) 1 passenger; and
(b) for the period of the flight, following a cabin depressurisation, during which the aeroplane's cabin pressure altitude exceeds 8 000 ft and does not exceed flight level 150.

(4) For paragraph (2)(c), the requirement is that the equipment must:
(a) be capable of generating a flow rate, calculated assuming dry oxygen gas at standard temperature and pressure, of at least 4 litres per minute per person; and
(b) have a means to reduce the flow to not less than 2 litres per minute per person at any altitude.

118 Oxygen masks for pilots

(1) For subregulation 135.620(1) of CASR, the following are prescribed:
(a) an oxygen mask, for use by each pilot who is in a pilot seat, must be fitted to the aeroplane;
(b) the oxygen mask must be within immediate reach of a pilot who is in a pilot seat.

(2) Also, for subregulation 135.620(1) of CASR, if, during the flight, the aeroplane will be flown above flight level 250, the following are prescribed:
(a) the oxygen mask must be of a kind that can, within 5 seconds of being deployed for use and with 1 hand from the ready-position, be placed on the face, and be secured and sealed;
(b) while the aeroplane is flown above flight level 250, at least 1 pilot who is in a pilot seat must wear and use the oxygen mask.

119 Protective breathing equipment

(1) For paragraph 135.620(1)(a) of CASR, the following equipment is prescribed:

(a) protective breathing equipment that can provide oxygen for at least 15 minutes, for each pilot who is in a pilot seat;

(b) if the aeroplane is required under the Regulations, or the aeroplane's flight manual, to be flown by at least 2 pilots—portable protective breathing equipment that can provide oxygen, or a mixture of oxygen and another suitable gas, continuously for at least 15 minutes, for each pilot who is in a pilot seat.

(2) For paragraph (1)(a), the oxygen supply for the portable breathing equipment for a pilot who is in a pilot seat may be from, and is not additional to, the amount of supplemental oxygen required for the flight under section 115.

(3) For paragraph 135.620(1)(d) of CASR, the following requirements are prescribed:

(a) the protective breathing equipment required by paragraph (1)(a) must be easily accessible for immediate use by a pilot while the pilot is in a pilot seat;

(b) the portable protective breathing equipment required by paragraph (1)(b) must be located in, or as close as is practicable to, the aeroplane's cockpit;

(c) the use of the protective breathing equipment, other than portable protective breathing equipment, must not prevent, or be likely to prevent, a pilot from effectively using the aeroplane's flight crew intercommunication system.

Subdivision 2—Non-pressurised aeroplanes

120 Application of Subdivision 2

This Subdivision applies to a non-pressurised aeroplane.

121 Supplemental oxygen equipment

For paragraph 135.620(1)(a) of CASR, supplemental oxygen equipment, which is capable of dispensing the amount of supplemental oxygen required for the flight by this Subdivision, is prescribed.

122 Amount of supplemental oxygen

(1) This section applies to a flight of an aeroplane to which an item mentioned in column 1 of the following table (the ***table***) applies.

(2) For paragraph 135.620(1)(b) of CASR, the amount of supplemental oxygen prescribed, for the segment of the flight mentioned in column 1 of an item in the table, is an amount that is sufficient to supply the percentage of the passengers, for the flight, mentioned in column 2 of the item for the period of the flight mentioned in column 3 of the item.

Table Amount of supplemental oxygen required for flight			
Item	**Column 1**	**Column 2**	**Column 3**
	If, during the flight …	**the aeroplane must carry supplemental oxygen to supply …**	**for the following period …**
1	both: (a) the aeroplane's cabin pressure altitude exceeds 10 000 ft for more than 30 minutes (the ***first 30 minutes***); and (b) the aeroplane's cabin pressure altitude does not exceed flight level 130	the following: (a) each pilot who is in a flight control seat; (b) each other person who is in a flight control seat and whose supplemental oxygen is provided from the flight crew's supplemental oxygen supply; (c) 10% of the passengers for the flight	the period, after the first 30 minutes, while the aeroplane's altitude exceeds 10 000 ft
2	the aeroplane's altitude exceeds flight level 130	all persons on board the aeroplane	the period while the aeroplane's altitude exceeds flight level 130

(2) In this section:

passenger:

(a) includes a pilot who is not in a pilot seat; but

(b) does not include a person who is in a pilot seat and whose supplemental oxygen is provided from the flight crew's supplemental oxygen supply.

Division 8—Emergency and survival equipment

123 Approved emergency locator transmitter etc.

(1) Subject to subsection (2), subsection (3) applies to a flight of an aeroplane if, during the flight, the aeroplane will not remain within 50 nautical miles of the departure aerodrome for the flight.

(2) Subsection (3) does not apply if:

(a) the aeroplane is fitted with an unserviceable approved emergency locator transmitter, and the flight is for the purpose of taking the aeroplane to a place for the repair or re-fitting of the transmitter; and

(b) an approved portable emergency locator transmitter is carried on the aeroplane during the flight; and

(c) no passengers are carried on the flight.

(3) For subregulation 135.685(1) of CASR, the following are prescribed:

(a) the aeroplane must be fitted with an approved emergency locator transmitter;

(b) the transmitter must be readily accessible to the crew, for the flight, during the flight.

(4) Subsection (5) applies to a flight of an aeroplane if:
   (a) during the flight, the aeroplane will remain within 50 nautical miles of the departure aerodrome for the flight; and
   (b) the aeroplane is not fitted with an approved emergency locator transmitter.

(5) For subregulation 135.685(1) of CASR, the following are prescribed:
   (a) the aeroplane must carry an approved portable emergency locator transmitter;
   (b) the transmitter must be readily accessible to the crew during the flight.

(6) If the aeroplane is required to carry a life raft equipped with an approved portable emergency locator transmitter under section 127 or 128, the requirement under that section is additional to the requirement under subsection (5).

124 Hand-held fire extinguishers

(1) This section prescribes the matters for subregulation 135.685(1) of CASR.

(2) At least 1 hand-held fire extinguisher must be located in the aeroplane's cockpit.

(3) If the aeroplane has a maximum operational passenger seat configuration of 7 or more, at least 1 hand-held fire extinguisher must be located in the aeroplane's passenger compartment.

(4) If a cargo or luggage compartment of the aeroplane is accessible in flight and is not fitted with a fixed fire and smoke detection and extinguishing system, at least 1 hand-held fire extinguisher must be located in, or as close as is practicable to, the compartment.

(5) The following requirements apply in relation to a hand-held fire extinguisher located in a compartment of the aeroplane under subsection (2), (3) or (4):
   (a) the type and quantity of extinguishing agent in the fire extinguisher must be suitable for extinguishing the kinds of fire likely to occur in the compartment;
   (b) the fire extinguisher must not be installed in a manner that is likely to facilitate the accidental discharge of its contents;
   (c) if the fire extinguisher is of the dry chemical type, it must not be located, or discharged, in:
      (i) the aeroplane's cockpit; or
      (ii) a compartment of the aeroplane that is not separated from the cockpit by a door or partition.

125 First-aid kit

(1) For paragraph 135.685(1)(a) of CASR, a first-aid kit is prescribed.

(2) For paragraph 135.685(1)(b) of CASR, the following requirements, relating to the first-aid kit, are prescribed:

(a) the first-aid kit must contain sufficient supplies for the number of persons to be carried on a flight of the aeroplane;
(b) the first-aid kid must be readily recognisable as a first-aid kit;
(c) the first-aid kit must be readily accessible by each crew member and adult passenger, if any, for a flight when the aeroplane is on the ground or water and not in operation.

126 Life jackets etc.

(1) This section applies to a flight of an aeroplane if:
(a) in the event of an emergency occurring during take-off or landing, the aeroplane is reasonably likely to land in water; or
(b) the aeroplane is a seaplane or amphibian; or
(c) for a single-engine aeroplane that is not a seaplane or amphibian—during the flight, the aeroplane will be flown further over water than the distance from which, with the engine inoperative, the aeroplane could reach a suitable forced landing area for the flight; or
(d) for a multi-engine aeroplane that is not a seaplane or amphibian—during the flight, the aeroplane will be flown more than 50 nautical miles from land.

(2) For paragraph 135.685(1)(a) of CASR, the following are prescribed:
(a) for each infant on board—an approved life jacket or infant flotation device;
(b) for each other person on board—an approved life jacket.

(3) If the aeroplane is a seaplane or amphibian and, during the flight, it will take-off from, or land on, water, a person on board who is not an infant must, during the take-off and landing stages of the flight, wear an approved life jacket, which is equipped with a survivor locator light and whistle.

(4) For paragraph 135.685(1)(b) of CASR, the following is prescribed:
(a) for each infant on board—unless the life jacket or infant flotation device is being worn by the infant, it must be stowed where it is readily accessible to an adult responsible for the infant;
(b) for each other person on board—unless the life jacket is being worn by the person, it must be stowed where it is readily accessible from the person's seat.

127 Life rafts—multi-engine aeroplanes

(1) This section applies to a flight of a multi-engine aeroplane if, during the flight, the aeroplane will be flown further over water than the shorter of the following distances:
(a) the distance that the aeroplane would fly in 30 minutes at its normal cruising speed in still air;
(b) 100 nautical miles.

(2) For subregulation 135.685(1) of CASR, the following are prescribed:
(a) the aeroplane must carry enough life rafts to provide a place on a life raft for each person, other than an infant, on board the aeroplane;

(b) each life raft carried on board must be equipped with:
(i) a survivor locator light; and
(ii) an approved portable emergency locator transmitter;
(c) each life raft must be stowed in a manner so that it can be readily deployed if the aeroplane has to ditch;
(d) if a life raft is stowed in a compartment or container, the compartment or container must be conspicuously marked as containing the life raft.

128 Life rafts—single-engine aeroplanes

(1) Subject to subsections (2) and (3), this section applies to a flight of a single-engine aeroplane if, during the flight, the aeroplane will be flown further over water than the distance in which, with the engine inoperative, the aeroplane could reach a suitable forced landing area for the flight.

(2) This section does not apply to the flight of an aeroplane over water for the purpose of climbing after take-off from, or descending to land at, an aerodrome when using a navigational procedure that is normal for that purpose.

(3) Also, this section does not apply to the flight of an aeroplane if:
(a) the aeroplane will be flown not more than the distance mentioned in subsection (4); and
(b) the operator's exposition includes measures to mitigate the risk to passengers, if any, of a forced landing of the aeroplane other than in, or on, a suitable forced landing area for the flight.

(4) For paragraph (3)(a), the distance is the total of:
(a) the distance that the aeroplane would fly in 5 minutes at its normal cruising speed in still air; and
(b) the distance in which, with the engine inoperative, the aeroplane could reach a suitable forced landing area for the flight.

(5) For subregulation 135.685(1) of CASR, the following are prescribed:
(a) the aeroplane must carry enough life rafts to provide a place on a life raft for each person, other than an infant, on board the aeroplane;
(b) each life raft carried on board must be equipped with:
(i) a survivor locator light; and
(ii) an approved portable emergency locator transmitter;
(c) each life raft must be stowed in a manner so that it can be readily deployed if the aeroplane has to ditch;
(d) if a life raft is stowed in a compartment or container, the compartment or container must be conspicuously marked as containing the life raft.

129 Sea anchors etc. and sound signalling equipment

(1) This section applies to a flight of an aeroplane if:
(a) the aeroplane is a seaplane or amphibian; and
(b) during the flight, it will take-off from, or land on, water.

(2) For paragraph 135.685(1)(a) of CASR, the following are prescribed:

(a) a sea anchor;
(b) equipment and fittings necessary for mooring the aeroplane;
(c) if the flight is conducted on, or over, water to which the International Regulations apply—equipment for making the sound signals required for the flight by the International Regulations.

Chapter 7—Flight crew

Division 1—Training and checking requirements

130 Purpose of Division 1

This Division prescribes the requirements for subregulation 135.745(4) of CASR.

131 Conversion training and operator proficiency checking requirements

(1) A flight crew member, for a flight, meets the conversion training and operator proficiency checking requirements for the aeroplane's operator and the aeroplane if:
(a) the flight crew member has successfully completed the operator's conversion training and operator proficiency check for the aeroplane; and
(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:
(a) training in the duties and responsibilities of the flight crew member's position;
(b) training in the operator's safety management system's risk assessment and management practices;
(c) training in the procedures relating to the operator's operations;
(d) training in the standard operating procedures for the aeroplane;
(e) normal and emergency procedures for an aeroplane of that kind;
(f) training specific to the operation of the aeroplane;
(g) emergency and safety equipment training, for the aeroplane, about the following:
(i) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life jackets—the actual donning of a life jacket by the flight crew member;
(ii) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life rafts—the use of a life raft;
(iii) the handling of fire extinguishers by the flight crew member;
(iv) the location, removal and use of all emergency and safety equipment carried on the aeroplane;
(v) aerodrome and aeroplane security procedures;
(vi) evacuation procedures;

(vii) procedures for dealing with emergency situations, both in flight and on the ground;

(viii) passenger briefing and safety demonstrations;

(ix) general emergency and survival training.

132 Differences training requirements

(1) A flight crew member, for a flight, meets the differences training requirements for the aeroplane's operator and the aeroplane if:

(a) the flight crew member has successfully completed the operator's differences training for the aeroplane; and

(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:

(a) if the limitations or systems of an aeroplane of that type are of a kind that the person has not previously received training for—training in the limitations or systems;

(b) if the equipment on an aeroplane of that type is of a kind that the person has not previously received training for—training in the location and use of the equipment;

(c) if the normal and emergency procedures on an aeroplane of that type are of a kind that the person has not previously received training for—training in the procedures.

133 Line training and operator proficiency checking requirements

(1) A flight crew member, for a flight, meets the line training and operator proficiency checking requirements for the aeroplane's operator and the aeroplane if:

(a) the flight crew member has successfully completed the operator's line training for the aeroplane; and

(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is training about the following:

(a) the aeroplane's procedures when conducting line operations;

(b) aerodrome and terminal ground handling and parking procedures;

(c) procedures for passenger handling and public safety during line operations;

(d) passenger briefing and safety demonstrations in line operations;

(e) specific route and aerodrome familiarisation;

(f) pre-flight, and post-flight, activities relating to line operations.

134 Recurrent training and operator proficiency checking requirements

(1) A flight crew member, for a flight, meets the recurrent training and operator proficiency checking requirements for the aeroplane's operator and the aeroplane if the requirements stated in this section are met by the flight crew member.

(2) The flight crew member must successfully undertake a recurrent operator proficiency check, which demonstrates that the flight crew member is competent

to carry out the flight crew member's duties, as a flight crew member, for flights with the aeroplane.

(3) The operator proficiency check mentioned in subsection (2) must be undertaken:
   (a) for a person who is a flight crew member only for VFR flights by day— initially between 5 and 7 months after commencing unsupervised line operations for the operator, and subsequently at intervals of not more than 12 months after the previous operator proficiency check; or
   (b) otherwise— at intervals of not more than 6 months after the previous operator proficiency check.

(4) The flight crew member must hold a general emergency and safety equipment training competency, in relation to the aeroplane, covering the matters mentioned in paragraph 131(2)(g).

(5) The competency mentioned in subsection (4) must be renewed by the flight crew member at 12-monthly intervals.

135 Use of available qualified flight simulator for training or checking etc.

RESERVED

136 Remedial training requirements

(1) This section applies if a flight crew member has had the flight crew member's line flying status, for the aeroplane, removed by the aeroplane's operator because of an unsuccessful operator proficiency check.

(2) Before being assigned to duty for a flight of the aeroplane, the flight crew member must have had the flight crew member's line flying status, for the aeroplane, reinstated by the operator after:
   (a) successfully completing the remedial training requirements identified in the operator proficiency check result; and
   (b) subsequently successfully completing an operator proficiency check for the aeroplane.

Division 2—Command training for pilot in command

137 Command training requirements

For paragraph 135.760(2)(c) of CASR, the requirements prescribed are the following:
   (a) either:
      (i) flying training conducted in an aeroplane of that kind; or
      (ii) training conducted in an approved flight simulator for an aeroplane of that kind;
   (b) successful completion of an operator proficiency check for the aeroplane that complies with the requirements of the operator's training and checking manual relating to a pilot in command of the aeroplane;
   (c) training in the responsibilities of the pilot in command of an aeroplane of that kind;

(d) training in relation to pilot incapacitation;
(e) supervised line flying on an aeroplane of that kind as pilot in command under supervision for the number of flight hours mentioned in the operator's training and checking manual;
(f) successful completion of a line operator proficiency check that complies with the requirements of the operator's training and checking manual relating to a pilot in command of the aeroplane.

Chapter 8—Crew other than flight crew

Division 1—Training and checking requirements for air crew

138 Purpose of Division 1

This Division prescribes the requirements for subregulation 135.820(2) of CASR.

139 Meaning of proficiency check

In this Chapter:

proficiency check means an assessment, conducted by an operator in accordance with the operator's training and checking responsibilities under CASR, of whether a person is competent to safely carry out the person's duties as an air crew member in the operator's aeroplane.

140 Conversion training and proficiency checking requirements

(1) An air crew member, for a flight, meets the conversion training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if:
(a) the air crew member has successfully completed the operator's conversion training and proficiency check for the aeroplane; and
(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:
(a) training in the duties and responsibilities of the air crew member's position;
(b) training in the operator's safety management system's risk assessment and management practices;
(c) training in the procedures relating to the operator's operations;
(d) training in the standard operating procedures for the aeroplane;
(e) normal and emergency procedures for an aeroplane of that kind;
(f) training specific to the operation of the aeroplane;
(g) emergency and safety equipment training, for the aeroplane, about the following:
(i) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life jackets—the actual donning of a life jacket by the air crew member and the use of the aeroplane's emergency exits;

(ii) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life rafts—the use of a life raft;

(iii) the handling of fire extinguishers by the air crew member;

(iv) the location, removal and use of all emergency and safety equipment carried on the aeroplane;

(v) aerodrome and aeroplane security procedures;

(vi) evacuation procedures;

(vii) procedures for dealing with emergency situations, both in flight and on the ground;

(viii) passenger briefing and safety demonstrations;

(ix) general emergency and survival training.

141 Differences training requirements

(1) An air crew member, for a flight, meets the differences training requirements for the operator of the aeroplane and the aeroplane if:

(a) the air crew member has successfully completed the operator's differences training for the aeroplane; and

(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:

(a) if the limitations or systems of an aeroplane of that type are of a kind that the person has not previously received training for—training in the limitations or systems;

(b) if the equipment on an aeroplane of that type is of a kind that the person has not previously received training for—training in the location and use of the equipment;

(c) if the normal and emergency procedures on an aeroplane of that type are of a kind that the person has not previously received training for—training in the procedures.

142 Line training and proficiency checking requirements

An air crew member, for a flight, meets the line training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if the air crew member has successfully completed the operator's line training for the aeroplane.

143 Recurrent training and proficiency checking requirements

(1) An air crew member, for a flight, meets the recurrent training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if the requirements stated in this section are met by the air crew member.

(2) The air crew member must successfully undertake a recurrent proficiency check, which demonstrates that the air crew member is competent to carry out the air crew member's duties, as an air crew member, for flights with the aeroplane.

(3) The proficiency check mentioned in subsection (2) must be undertaken at 12-monthly intervals.

(4) The air crew member must hold a general emergency and safety equipment training competency, in relation to the aeroplane, covering the matters mentioned in paragraph 140(2)(g).

(5) The competency mentioned in subsection (4) must be renewed by the air crew member at 12-monthly intervals.

144 Remedial training requirements

(1) This section applies if an air crew member has had the air crew member's line flying status, for the aeroplane, removed by the aeroplane's operator because of an unsuccessful proficiency check.

(2) Before being assigned to duty for a flight of the aeroplane, the air crew member must have had the air crew member's line flying status, for the aeroplane, reinstated by the operator after:

(a) successfully completing the remedial training requirements identified in the proficiency check result; and

(b) subsequently successfully completing a proficiency check for the aeroplane.

Division 2—Training and checking requirements for medical transport specialists

145 Purpose of Division 2

This Division prescribes the requirements for subregulation 135.835(2) of CASR.

146 Meaning of *proficiency check*

In this Division:

proficiency check means an assessment, conducted by an operator in accordance with the operator's training and checking responsibilities under CASR, of whether a person is competent to safely carry out the person's duties as a medical transport specialist in the operator's aeroplane.

147 Conversion training and proficiency checking requirements

(1) A medical transport specialist, for a flight, meets the conversion training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if:

(a) the medical transport specialist has successfully completed the operator's conversion training and proficiency check for the aeroplane; and

(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:

(a) training in the duties and responsibilities of the medical transport specialist's position;

(b) training in the operator's safety management system's risk assessment and management practices;

(c) training in the procedures relating to the operator's operations;

(d) training in the standard operating procedures for the aeroplane;

(e) normal and emergency procedures for an aeroplane of that kind;

(f) training specific to the operation of the aeroplane;

(g) emergency and safety equipment training, for the aeroplane, about the following:

(i) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life jackets—the actual donning of a life jacket by the medical transport specialist and the use of the aeroplane's emergency exits;

(ii) if the aeroplane is, or will be, used to conduct a flight for which regulation 135.685 of CASR requires the aeroplane to carry life rafts—the use of a life raft;

(iii) the handling of fire extinguishers by the medical transport specialist;

(iv) the location, removal and use of all emergency and safety equipment carried on the aeroplane;

(v) aerodrome and aeroplane security procedures;

(vi) evacuation procedures;

(vii) procedures for dealing with emergency situations, both in flight and on the ground;

(viii) passenger briefing and safety demonstrations;

(ix) general emergency and survival training.

148 Differences training requirements

(1) A medical transport specialist, for a flight, meets the differences training requirements for the operator of the aeroplane and the aeroplane if:

(a) the medical transport specialist has successfully completed the operator's differences training for the aeroplane; and

(b) the training includes the training mentioned in subsection (2).

(2) For paragraph (1)(b), the training is the following:

(a) if the limitations or systems of an aeroplane of that kind are of a kind that the person has not previously received training for—training in the limitations or systems;

(b) if the equipment on an aeroplane of that kind is of a kind that the person has not previously received training for—training in the location and use of the equipment;

(c) if the normal and emergency procedures for an aeroplane of that kind are of a kind that the person has not previously received training for—training in the procedures.

149 Line training and proficiency checking requirements

A medical transport specialist, for a flight, meets the line training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if the medical transport specialist has successfully completed the operator's line training for the aeroplane.

150 Recurrent training and proficiency check requirements

(1) A medical transport specialist, for a flight, meets the recurrent training and proficiency checking requirements for the operator of the aeroplane and the aeroplane if the requirements stated in this section are met by the medical transport specialist.

(2) The medical transport specialist must successfully undertake a recurrent proficiency check, which demonstrates that the medical transport specialist is competent to carry out the medical transport specialist's duties, as a medical transport specialist, for flights with the aeroplane.

(3) The proficiency check mentioned in subsection (2) must be undertaken at 12-monthly intervals.

(4) The medical transport specialist must hold a general emergency and safety equipment training competency, in relation to the aeroplane, covering the matters mentioned in paragraph 147(2)(g).

(5) The competency mentioned in subsection (4) must be renewed by the medical transport specialist at 12-monthly intervals.

151 Remedial training requirements

(1) This section applies if a medical transport specialist has had the medical transport specialist's line flying status, for the aeroplane, removed by the aeroplane's operator because of an unsuccessful proficiency check.

(2) Before being assigned to duty for a flight of the aeroplane, the medical transport specialist must have had the medical transport specialist's line flying status, for the aeroplane, reinstated by the operator after:

(a) successfully completing the remedial training requirements identified in the proficiency check result; and

(b) subsequently successfully completing a proficiency check for the aeroplane.