



# Australian Government

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## Civil Aviation Safety Authority

### Civil Aviation Order 20.18 (as amended)

made under regulation 207 of the *Civil Aviation Regulations 1988*.

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Prepared by the Legislative Drafting Branch, Legal Services Group, Civil Aviation Safety Authority, Canberra.

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### Section 20.18

#### Aircraft equipment — basic operational requirements

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##### 1 Application

This section applies to all Australian registered aircraft.

*Note* Particular attention is drawn to the fact that this section does not include requirements for oxygen equipment, radio apparatus or emergency equipment which are specified in Civil Aviation Orders sections 20.4 and 20.11 respectively.

## 2 Definitions

In this section, unless a contrary intention appears:

**minimum equipment list** means a list that provides for the operation of aircraft with permissible unserviceabilities, subject to compliance with such conditions, if any, as CASA directs under subregulation 37 (2) of the Regulations.

**permissible unserviceability** means any defect or damage that CASA has approved under subregulation 37 (1) of the Regulations as a permissible unserviceability.

**TAWS-B+ system** means a terrain awareness and warning system that is equipped with a visual display and complies with the requirements for Class B equipment expressed in TSO-C151, TSO-C151a or TSO-C151b.

**the Regulations** means the *Civil Aviation Regulations 1988*.

## 3 Instrumentation for flight under Visual Flight Rules

- 3.1 An aircraft, other than a helicopter, engaged in private, aerial work or charter operations, except an aeroplane having a maximum take-off weight greater than 5 700 kg engaged in charter operations, shall not be operated under the Visual Flight Rules unless it is equipped with the instruments specified in Appendix I to this section and any other instruments and indicators specified in the aircraft flight manual.
- 3.2 An aeroplane engaged in regular public transport operations, and an aeroplane having a maximum take-off weight greater than 5 700 kg engaged in charter operations shall not be operated under the Visual Flight Rules unless it is equipped with the instruments specified in Appendix II to this section and any other instruments and indicators specified in the aeroplane flight manual.
- 3.3 A helicopter operating under the Visual Flight Rules shall be equipped with the instruments specified in Appendix VI to this section and any other instruments and indicators specified in the helicopter flight manual.

## 4 Equipment for flight under Instrument Flight Rules

- 4.1 An aeroplane shall not be operated under the Instrument Flight Rules unless it is equipped with:
  - (a) the flight and navigation instruments specified in Appendixes II, III and IV to this section as applicable; and
  - (b) any other instruments or indicators specified in the aeroplane flight manual; and
  - (c) the minimum lighting equipment specified in Appendix V to this section; and
  - (e) in the case of single pilot regular public transport operations, earphones for the pilot with boom or throat microphone and a press to transmit control on the control column. The earphones and microphone shall be compatible with the radio installation in the aeroplane, and shall be used by the pilot during flight.
- 4.1A Subject to paragraphs 4.1B and 4.1C, an aeroplane engaged:
  - (a) in regular public transport operations; or
  - (b) in charter operations; or
  - (c) in aerial work operations as an air ambulance or for a flying doctor service;must not be operated under the Instrument Flight Rules unless it is equipped with a serviceable automatic pilot approved by CASA that has the following capabilities:
  - (d) a capability of operating the flight controls to maintain flight and manoeuvre the aeroplane about the roll and pitch axis;
  - (e) an automatic heading capability;

- (f) an altitude hold capability.

*Note* For the purpose of meeting the requirements of subparagraph 4.1A (d), an automatic pilot is taken to have the capability of manoeuvring the aeroplane about the pitch axis if it does so solely to restore the selected altitude after a disturbance.

- 4.1B In spite of paragraph 4.1A, an aeroplane referred to in that paragraph that is not equipped with an automatic pilot in accordance with that paragraph may be operated under the Instrument Flight Rules, if the aeroplane:

- (a) is equipped with fully functioning dual controls; and
- (b) has 2 control seats, with 1 control seat occupied by the pilot in command of the aeroplane and the other by a person who holds a commercial pilot (aeroplane) licence or an air transport pilot (aeroplane) licence with:
  - (i) an endorsement for that type of aeroplane; and
  - (ii) at least a co-pilot (aeroplane) instrument rating.

- 4.1C If the automatic pilot fitted to an aeroplane engaged:

- (a) in charter operations; or
  - (b) in aerial work operations as an air ambulance or for a flying doctor service;
- loses a capability referred to in paragraph 4.1A, the aeroplane may, if the pilot is satisfied that it is safe to do so, be operated under the Instrument Flight Rules by a single pilot at any time within the period of 3 days commencing on the day on which the automatic pilot loses the capability.

- 4.1D Paragraphs 4.1A, 4.1B and 4.1C apply in addition to, and not in derogation of, paragraph 4.1.

- 4.2 A helicopter shall not be operated under the Instrument Flight Rules unless it is equipped with:

- (a) the flight and navigation instruments specified in Appendixes VII, VIII, or IX to this section as applicable; and
- (b) any other instruments, indicators or equipment specified in the helicopter flight manual; and
- (c) the minimum lighting equipment specified in Appendix V to this section; and
- (d) an approved automatic pilot, or automatic stabilisation system, for other than night VFR flights except that in the case of such flight which will involve more than 30 minutes flight over water or over land areas where aircraft altitude cannot be maintained by reference to ground lighting, an approved autostabilisation system or a 2 pilot crew shall be carried.

*Note* Because of considerable variation in the individual stability characteristics of different helicopter types and in the associated automatic pilot and automatic stabilisation systems approved by the certification authority in the country of certification, it is not possible to detail precise specifications for this equipment. This consideration also applies to the flight crew complement. Accordingly each application for approval to conduct I.F.R category operations will be individually assessed on the basis of the specific helicopter type and its associated automatic pilot or autostabilisation equipment and the proposed operating environment.

## 5 Windshield clear vision equipment

An aircraft shall not be operated under the Visual or Instrument Flight Rules unless it is equipped with a means of clearing precipitation from the outside of the flight compartment windshield at a rate which will ensure that during heavy precipitation each pilot has an unobstructed view through the windshield except that, for aeroplanes less than 5 700 kg maximum take-off weight and helicopters less than 2 750 kg maximum take-off weight, this equipment need not be fitted if evidence can be

produced to the satisfaction of CASA that the windshield has been designed in such a manner that moderate rain conditions do not unduly impair the view of the flight path in normal flight and while taking-off or landing.

*Note* Manually operated devices shall not be deemed to meet the requirements of this paragraph.

## **6 Recording equipment**

6.1 An aircraft of maximum take-off weight:

(a) In excess of 5 700 kg and which is:

- (i) turbine powered; or
- (ii) of a type first certificated in its country of manufacture on or after 1 July 1965;

shall not be flown (except in agricultural operations) unless it is equipped with an approved flight data recorder and an approved cockpit voice recorder system;

(b) Less than or equal to 5 700 kg and which is:

- (i) pressurised; and
- (ii) turbine powered by more than 1 engine; and
- (iii) of a type certificated in its country of manufacture for operation with more than eleven places; and
- (iv) issued with its initial Australian Certificate of airworthiness after 1 January 1988;

shall not be flown unless it is equipped with an approved cockpit voice recorder system.

6.1A Paragraph 6.1 does not apply to an aircraft for which there is in force an airworthiness certificate in the agricultural category or the restricted category.

6.2 The flight data recorder and cockpit voice recorder systems installed in an aircraft under this section:

- (a) must comply with the requirements of section 103.19 and 103.20 respectively; and
- (b) will be considered for approval when CASA has equipment available allowing replay of the recordings.

6.3 Where an aircraft is required to be so equipped by this section, the flight data recorder system shall be operated continuously from the moment when the aircraft commences to taxi under its own power for the purpose of flight until the conclusion of taxiing after landing.

6.4 Where an aircraft is required to be so equipped by this section, the cockpit voice recorder system shall be operated continuously from the start of the use of the check list before starting engines for the purpose of flight until completion of the final check list at the termination of the flight.

6.5 Where an aircraft is required to be so equipped by this section the operator shall ensure that:

- (a) the flight data recorder retains its last 25 hours of recording; and
- (b) the cockpit voice recorder retains its last 30 minutes of recording; and
- (c) data from the last 2 occasions on which the flight data recorder system was calibrated from which the accuracy of the system can be determined are preserved.

6.6 The operator of an aircraft which is required by this section to be equipped with recorders shall take action to ensure that during ground maintenance periods the

recorders are not activated unless the maintenance is associated with the flight data recording equipment or with the aircraft engines.

- 6.7 An aircraft required to be fitted with a flight data recorder system and/or a cockpit voice recorder system may operate with an unserviceable recorder system for a period of 21 days commencing on the day on which the system was determined to be unserviceable providing that:
- (a) the aircraft does not depart from an aerodrome where staff and equipment are available to replace the unserviceable units; and
  - (b) where the aircraft is required to be fitted with both a flight data recorder and cockpit voice recorder system, 1 system is serviceable; and
  - (c) the aircraft is not operating training or test flights.

## **7 Assigned altitude indicator and altitude alerting system**

- 7.1 Piston engined aircraft and unpressurised turbine engine aircraft operating above 15 000 feet in controlled airspace under Instrument Flight Rules (except night V.M.C.) shall be equipped with an altitude alerting system.
- 7.2 Pressurised turbine engined aircraft operating in controlled airspace under Instrument Flight Rules (except night V.M.C.) shall be equipped with an altitude alerting system.
- 7.3 Unless equipped with an altitude alerting system, an aircraft operating in controlled airspace under Instrument Flight Rules (except night V.M.C.) shall be equipped with an assigned altitude indicator.
- 7.4 An altitude alerting system or an assigned altitude indicator shall be so designed and located that:
- (a) it can be readily adjusted for setting from each pilot seat; and
  - (b) the assigned altitude/flight level display is clearly discernible by day and night to all operating flight crew members whose duties involve altitude/flight level assignment monitoring; and
  - (c) altitude/flight levels may be pre-selected unambiguously in increments commensurate with levels at which the aircraft may be operated.
- 7.5 The assigned altitude indicator shall be demonstrated to the satisfaction of CASA.
- 7.6 The altitude alerting system shall be demonstrated to the satisfaction of CASA and be capable of:
- (a) alerting the pilot upon approaching or departing from a pre-selected level in both climb and descent by aural and/or visual signals in sufficient time to establish level flight at the pre-selected level, except that altitude alerting systems in aircraft first registered in Australia before 1 January 1983 need not alert the pilot when departing from a pre-selected altitude; and
  - (b) providing the required signals from sea level to the highest operating altitude approved for the aircraft in which it is installed; and
  - (c) being tested without separate equipment to determine proper operation of the alerting signals; and
  - (d) accepting necessary barometric pressure settings in millibars if the system or device operates on barometric pressure.

## **8 Radiation indicator**

All aeroplanes intended to be operated above 49 000 feet shall carry equipment to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e. the total of ionizing and neutron radiation of galactic and solar origin)

and the cumulative dose on each flight. The display unit shall be readily visible to a flight crew member.

## **9 Ground proximity warning system**

9.1 Subject to paragraphs 9.1A and 9.1C, a turbine engined aeroplane that:

- (a) has a maximum take-off weight of more than 15 000 kg or is carrying 10 or more passengers; and
  - (b) is engaged in regular public transport, or charter, operations;
- must not be operated under the Instrument Flight Rules unless it is fitted with a ground proximity warning system that meets the requirements of section 108.36.

9.1A Paragraph 9.1 does not apply to an aeroplane if:

- (a) at any time before the aeroplane is operated under the Instrument Flight Rules in regular public transport, or charter, operations, the person who was, at that time, the holder of the AOC authorising the operation of the aeroplane has given to CASA an undertaking in an approved form that the aeroplane will, on or before 1 January 2001, be fitted with an approved ground proximity warning system that has a predictive terrain hazard warning function; and
- (b) the operations manual provided by the holder of the AOC authorising the operation of the aeroplane sets out the details of a course of training in awareness of controlled flight into terrain; and
- (c) the pilot in command of the aeroplane, and (if applicable) any other pilot occupying a control seat in the aeroplane, have completed the course of training.

9.1B Paragraphs 9.1 and 9.1A cease to have effect at the end of 31 December 2000.

9.1C A turbine engined aeroplane that:

- (a) has a maximum take-off weight of more than 15 000 kg or is carrying 10 or more passengers; and
  - (b) is engaged in regular public transport, or charter, operations;
- must not be operated under the Instrument Flight Rules unless it is fitted with:
- (c) an approved ground proximity warning system (GPWS) that has a predictive terrain hazard warning function; or
  - (d) if paragraph 9.1CA applies — a GPWS that meets the requirements of section 108.36 (a section 108.36 GPWS); or
  - (e) if the aeroplane has a maximum take-off weight of 5 700 kg or less, but is carrying 10 or more passengers — a TAWS-B+ system.

9.1CA Up to the end of June 2005, an aeroplane may be fitted with a section 108.36 GPWS:

- (a) if, immediately before 1 January 2001, paragraph 9.1 applied to the aeroplane; or
- (b) if the aeroplane first becomes an Australian aeroplane on or after 1 January 2001 (unless it is an aircraft in respect of which an undertaking has been given under paragraph 5.3 of section 82.1 or paragraph 10.3 of section 82.3 or 82.5, as in force immediately before 1 January 2001); or
- (c) if:
  - (i) immediately before 1 January 2001, paragraph 9.1 did not apply to the aeroplane because of paragraph 9.1A; and
  - (ii) the holder of the AOC authorising the operation of the aeroplane (the AOC holder) provides satisfactory evidence to CASA, in accordance with paragraph 9.1CB, that it is not possible to fit the aeroplane with an approved GPWS that has a predictive terrain hazard warning function.

- 9.1CB For the purposes of sub-subparagraph 9.1CA (c) (ii), evidence is taken to be satisfactory only if it is:
- (a) a statement in writing to the AOC holder from the manufacturer of an approved GPWS that has a predictive terrain hazard warning function; or
  - (b) a statutory declaration by the AOC holder;
- to the effect that the FAA's list of supplemental type certificates does not include any reference to a supplemental type certificate relating to the fitting of an aeroplane of the same type with an approved GPWS that has that function.
- 9.1D For the purposes of this subsection:
- (a) a GPWS has a ***predictive terrain hazard warning function*** if it employs an aircraft navigation system and a terrain data base to compute a display of terrain along, and in the vicinity of, the flight path of an airborne aeroplane in order to provide the flight crew of the aeroplane with a warning of any terrain that may endanger the aeroplane if its flight path were to remain unchanged; and
  - (b) the GPWS is taken to be approved only if it meets:
    - (i) the requirements set out in FAA notice N 8110.64 as in force on 15 August 1999; or
    - (ii) the standard for the Class A Terrain Awareness Warning System specified in TSO C-151, TSO C-151a or TSO C-151b.
- 9.2 A ground proximity warning system shall be demonstrated to the satisfaction of CASA to be capable of providing automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.
- 9.3 Except as provided in paragraph 9.4 an aeroplane required to be fitted with a ground proximity warning system shall not commence a flight with that equipment unserviceable.
- 9.4 An aeroplane required to be fitted with a ground proximity warning system shall not depart with that equipment unserviceable from an aerodrome where facilities are available to repair or replace the ground proximity warning system and in no case shall an aeroplane be operated with its ground proximity warning system unserviceable for a period exceeding 24 hours from the time the equipment was determined to be unserviceable.

## **9A Directions relating to use of computers with the global positioning system**

- 9A.1 This subsection applies in relation to computers fitted in an aircraft for use with GPS and sets out CASA's directions for the purposes of regulation 232A of the Regulations.
- 9A.2 In this subsection:  
***GPS computer*** means a computer in relation to which this subsection applies.  
***GPS*** means the United States Department of Defence satellite navigation system known as the Global Positioning System.
- 9A.3 If particulars of way points and navigation aids that are published in maps and charts required to be carried in the aircraft under paragraph 233 (1) (h) of the Regulations are included in a GPS computer's data base, then those particulars must be in a form that cannot be modified by the aircraft operator or flight crew members.

- 9A.4 A GPS computer's data base referred to in paragraph 9A.3 must be current and provided by a person who is an approved supplier for the purposes of paragraph 233 (1) (h) of the Regulations.
- 9A.5 Operating instructions for a GPS computer, supplied by the supplier of the computer, must be carried in the aircraft, in a place easily accessible to the computer's user.
- 9A.6 If the aircraft is engaged in commercial operations, the operating instructions must be incorporated in the aircraft's operations manual.
- 9A.7 A GPS computer must be operated in accordance with its operating instructions.
- 9A.8 Additional requirements relating to the operation of a GPS computer may be incorporated in an aircraft's flight manual, if they are consistent with the operating instructions.
- 9A.9 Manually entered data in a GPS computer must be cross-checked by not less than 2 flight crew members for accuracy.
- 9A.10 In the case of a single pilot operation, manually entered data in a GPS computer must be checked against other aeronautical information, such as current maps and charts carried in the aircraft in accordance with paragraph 233 (1) (h) of the Regulations.

**9B Directions relating to carriage and use of automatic dependent surveillance – broadcast equipment**

- 9B.1 This subsection applies to aircraft engaged in private, aerial work, charter or regular public transport operations.

- 9B.2 In this subsection and Appendix XI:

**ADS-B** means automatic dependent surveillance – broadcast.

**ADS-B test flight** means a flight to prove ADS-B transmitting equipment that is newly installed on the aircraft undertaking the flight.

**aircraft address** means a unique combination of 24 bits assigned to an aircraft by CASA or by a relevant RAAO for the purpose of air to ground communications, navigation and surveillance.

**approved equipment configuration** means an equipment configuration that:

- (a) meets the conditions for approval set out in Appendix XI; or
- (b) is approved in writing by CASA.

*Note* Equipment configurations approved by CASA are published in Appendix D of Advisory Circular 21-45.

**ATSO** means Australian Technical Standard Order of CASA.

**EASA** means the European Aviation Safety Agency.

**ETSO** means European Technical Standard Order of the EASA.

**FAA** means the Federal Aviation Administration of the United States.

**FL 290** means flight level 290.

*Note* Flight level 290 is defined in subregulation 2 (1) of CAR 1988.

**RAAO** means a recreational aviation administration organisation that is recognised by CASA.

**TSO** means Technical Standard Order of the FAA.

- 9B.3 If an aircraft carries ADS-B transmitting equipment for operational use in Australian territory, the equipment must comply with an approved equipment configuration.



- 9B.4 If an aircraft carries ADS-B transmitting equipment for operational use in Australian territory, the equipment must transmit:
- (a) a flight identification that corresponds exactly to the aircraft identification mentioned on the flight notification filed with air traffic control (*ATC*) for the flight; or
  - (b) if no flight notification is filed for the flight — a flight identification that is:
    - (i) for an aircraft registered on the Australian Civil Aircraft Register and operating wholly within Australian territory — the aircraft's registration mark; or
    - (ii) for an Australian aircraft registered by a RAAO — in accordance with the organisation's operations manual; or
  - (c) another flight identification directed or approved by ATC.
- 9B.5 If an aircraft carries ADS-B transmitting equipment that complies with an approved equipment configuration, the equipment must be operated continuously during the flight in all airspace at all altitudes unless the pilot is directed or approved otherwise by ATC.
- 9B.6 If an aircraft carries ADS-B transmitting equipment which does not comply with an approved equipment configuration, the equipment must be deactivated before the aircraft flies in Australian territory.
- 9B.7 However, the equipment need not be deactivated as mentioned in paragraph 9B.6 if the aircraft is undertaking an ADS-B test flight in VMC in airspace below FL 290.
- 9B.8 On and after 12 December 2013, if an aircraft operates at or above FL 290, it must carry serviceable ADS-B transmitting equipment that complies with an approved equipment configuration.
- Note* On and after 12 December 2013, an aircraft must carry and continuously operate compliant ADS-B transmitting equipment in accordance with paragraph 9B.8.
- Apart from this, there is no obligation to carry compliant ADS-B transmitting equipment.
- However, including the effect of subsection 9B.5 above, if compliant ADS-B transmitting equipment is in fact carried, whether voluntarily or in accordance with the obligation under 9B.8, it must be operated continuously in all airspace, at all altitudes.
- 9B.9 Paragraph 9B.8 does not apply to an aircraft if the aircraft owner, operator or pilot has written authorisation from CASA for the operation of the aircraft without the equipment.

## **10 Serviceability**

- 10.1 In the case of a charter or regular public transport aircraft, all instruments and equipment fitted to the aircraft must be serviceable before take-off, unless:
- (a) flight with unserviceable instruments or equipment has been approved by CASA, subject to such conditions as CASA specifies; or
  - (b) the unserviceability is a permissible unserviceability set out in the minimum equipment list for the aircraft and any applicable conditions under subregulation 37 (2) of the Regulations have been complied with; or
  - (c) CASA has approved the flight with the unserviceable instrument or equipment and any applicable conditions that CASA has specified in writing have been complied with; or
  - (d) the unserviceable instrument or equipment is a passenger convenience item only and does not affect the airworthiness of the aircraft.

- 10.1A A private or aerial work aircraft must not be operated:
- (a) under the V.F.R., unless:
    - (i) all instruments and equipment required to be fitted to the aircraft under subsection 3 are serviceable before take-off; or
    - (ii) CASA has approved the flight with the unserviceable instrument or equipment and any applicable conditions that CASA has specified in writing have been complied with; or
  - (b) under the I.F.R., unless:
    - (i) all instruments and equipment required to be fitted to the aircraft under subsection 4 are serviceable before take-off; or
    - (ii) CASA has approved the flight with the unserviceable instrument or equipment and any applicable conditions that CASA has specified in writing have been complied with.
- 10.2 Where flight is conducted with unserviceable instruments or equipment under the provisions of paragraph 10.1 or 10.1A, the unserviceable instruments or equipment shall be prominently placarded 'UNSERVICEABLE' or removed from the aircraft.
- Note* Where an instrument or piece of equipment performs more than 1 function, it is permissible to placard as unserviceable only the function(s) which are unserviceable.
- 10.3 The holder of an Air Operator's Certificate authorising a regular public transport operation must:
- (a) have a minimum equipment list or lists for the aircraft used to conduct those operations; and
  - (b) include each list in the operations manual for the aircraft to which that list applies.
- 10.4 The holder of an Air Operator's Certificate authorising charter operations:
- (a) may have a minimum equipment list or lists for the aircraft used to conduct those operations; and
  - (b) must include each list in the operations manual for the aircraft to which that list applies.

## **Appendix I**

### **Instruments required for flight under Visual Flight Rules**

(Limited to aircraft specified in subsection 3 paragraph 3.1)

- 1 The flight and navigational instruments required for flights under the Visual Flight Rules are:
  - (a) an airspeed indicating system; and
  - (b) an altimeter, with a readily adjustable pressure datum setting scale graduated in millibars; and
  - (c)
    - (i) a direct reading magnetic compass; or
    - (ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds. This may be carried on the person of the pilot or navigator.
- 2 In addition to the instruments required under paragraph 1, aircraft, other than helicopters, engaged in charter or aerial work operations and operating under the Visual Flight Rules, shall be equipped with:
  - (a) a turn and slip indicator (agricultural aeroplanes may be equipped with a slip indicator only); and
  - (b) an outside air temperature indicator when operating from an aerodrome at which ambient air temperature is not available from ground-based instruments.

## Appendix II

### Instruments required for:

- (i) aeroplanes engaged in regular public transport operations; and**
- (ii) aeroplanes engaged in charter operations which have a maximum take-off weight greater than 5 700 kg**

- 1 The flight and navigation instruments required are:
  - (a) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing; and
  - (b) 2 sensitive pressure altimeters; and
  - (c)
    - (i) a direct reading magnetic compass; or
    - (ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds; and
  - (e) a rate of climb and descent indicator (vertical speed indicator); and
  - (f) an outside air temperature indicator; and
  - (g) 2 attitude indicators (artificial horizons); and
  - (h) a heading indicator (directional gyroscope or equivalent approved by CASA); and
  - (i) a turn and slip indicator except that only a slip indicator is required when a third attitude indicator usable through flight attitudes of 360 degrees of pitch and roll is installed in accordance with subparagraph (k) of this Appendix; and
  - (j) a means of indicating whether the power supply to those instruments requiring power is working satisfactorily; and
  - (k) in turbo-jet aeroplanes having a maximum take-off weight greater than 5 700 kg and in turbo-prop aeroplanes having a maximum take-off weight greater than 18 000 kg a third attitude indicator which:
    - (i) is powered from a source independent of the electrical generating system; and
    - (ii) continues to provide reliable indications for a minimum of 30 minutes after total failure of the electrical generating system; and
    - (iii) is operative without selection after total failure of the electrical generating system; and
    - (iv) is located on the instrument panel in a position which will make it plainly visible to and usable by any pilot at his station; and
    - (v) is appropriately lighted during all phases of operation; and
  - (l) in turbo-jet aeroplanes with operating limitations expressed in terms of Mach number, a Mach number indicator (Machmeter).
- 2 (a) For aeroplanes above 5 700 kg maximum take-off weight, the instruments used by the pilot in command and which are specified in subparagraphs 1 (a), (b), (e) and (l) of this Appendix shall be capable of being connected either to a normal or an alternate static source but not both sources simultaneously. Alternatively the aeroplane may be fitted with 2 independent static sources each consisting of a balanced pair of flush static ports of which 1 is used for the instruments specified above. Instruments and equipment other than flight instruments provided for use by the pilot in command, shall not be connected to the normal static system that operates the instruments of the pilot in command;

- (b) for aeroplanes not above 5 700 kg maximum take-off weight, the instruments specified in subparagraphs 1 (a), (b), (e) and (l) of this Appendix shall be capable of being connected to either a normal or alternate static source but not both sources simultaneously. Alternatively the aeroplane may be fitted with a balanced pair of flush static ports.
- 3 The instruments specified in subparagraphs 1 (g), (h) and (i) of this Appendix shall have duplicated sources of power supply.
- 4 CASA may, having regard to the type of aeroplane, approve an attitude indicator incorporated in an automatic pilot system being 1 of the 2 attitude indicators required by subparagraph 1 (g) of this Appendix.
- 5 A gyro-magnetic type of remote indicating compass installed to meet the requirements of subparagraph 1 (c) (ii) of this Appendix may also be considered to meet the requirement for a heading indicator specified in subparagraph 1 (h) of this Appendix, provided that it has a duplicated power supply.
- 6 For Visual Flight Rules flight, the following instruments may be unserviceable:
  - (a) the attitude indicator required by paragraph 1 (k);
  - (b) 1 of the attitude indicators required by paragraph 1 (g) provided that the attitude indicator required by paragraph 1 (k) is serviceable or an attitude indicator has been provided to meet the requirements of paragraph 1 (i) and is serviceable;
  - (c) the turn and slip indicator or slip indicator and attitude indicator required by paragraph 1 (i).

## Appendix III

### **Instruments required for aeroplanes with a maximum take-off weight not greater than 5 700 kg engaged in charter operations under the Instrument Flight Rules (except night V.M.C.) excluding freight only charter operations**

- 1 The flight and navigation instruments required are:
  - (a) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing; and
  - (b) 2 sensitive pressure altimeters; and
  - (c) (i) a direct reading magnetic compass; or  
(ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds; and
  - (e) a rate of climb and descent indicator (vertical speed indicator); and
  - (f) an outside air temperature indicator; and
  - (g) 2 attitude indicators (artificial horizons); and
  - (h) a heading indicator (directional gyroscope or equivalent approved by CASA); and
  - (i) a turn and slip indicator except that only a slip indicator is required when a third attitude indicator usable through flight attitude of 360 degrees pitch and roll is installed; and
  - (j) a means of indicating whether the power supply to the gyroscopic instruments is working satisfactorily; and
  - (k) in turbo-jet aeroplanes with operating limitations expressed in terms of Mach number, a Mach number indicator (Machmeter).
- 2 The instruments specified in 1 (a), (b), (e) and (k) of this Appendix shall be capable of being connected to either a normal or alternate static source but not both sources simultaneously. Alternatively, they may be connected to a balanced pair of flush static ports.
- 3 The instruments specified in 1 (g), (h) and (i) of this Appendix shall have duplicated sources of power supply.
- 4 CASA may, having regard to the type of aeroplane, approve an attitude indicator incorporated in an automatic pilot system as being 1 of the 2 attitude indicators required by subparagraph 1 (g) of this Appendix.
- 5 A gyro-magnetic type of remote indicating compass installed to meet the requirements of subparagraph 1 (c) (ii) of this Appendix may also be considered to meet the requirement for a heading indicator specified in subparagraph 1 (h) of this Appendix, provided it has a duplicated power supply.

## Appendix IV

### Instruments required for aeroplanes engaged in:

- (i) aerial work and private operations under the Instrument Flight Rules (including night V.M.C.); and**
  - (ii) charter operations under night V.M.C; and**
  - (iii) Instrument Flight Rules freight only charter operations in aeroplanes with maximum take-off weight not greater than 5 700 kg.**
- 1 The flight and navigational instruments required are:
    - (a) an airspeed indicating system; and
    - (b) a sensitive pressure altimeter; and
    - (c) (i) direct reading magnetic compass; or  
(ii) a remote indicating compass and a standby direct reading magnetic compass; and
    - (d) an accurate timepiece indicating the time in hours, minutes and seconds, except that this may be omitted if it is carried on the person of the pilot or navigator; and
    - (e) a rate of climb and descent indicator (vertical speed indicator) for other than night V.M.C. flights; and
    - (f) an outside air temperature indicator; and
    - (g) an attitude indicator (artificial horizon); and
    - (h) a heading indicator (directional gyroscope); and
    - (i) a turn and slip indicator except that only a slip indicator is required when a second attitude indicator usable through flight attitudes of 360 degrees of pitch and roll is installed; and
    - (j) means of indicating whether the power supply to the gyroscopic instruments is working satisfactorily; and
    - (k) except for aeroplanes engaged in night V.M.C. flights, means of preventing malfunctioning due to either condensation or icing of at least 1 airspeed indicating system.
  - 2 The instruments specified in subparagraphs 1 (a), (b), (e) and (k) of this Appendix shall be capable of being connected to either a normal or an alternate static source but not both sources simultaneously. Alternatively, they may be connected to a balanced pair of flush static ports.
  - 3 Except for aeroplanes engaged in night V.M.C. private and aerial work operations the instruments specified in subparagraphs 1 (g), (h) and (i) of this Appendix shall have duplicated sources of power supply unless the turn and slip indicator or the second attitude indicator specified in subparagraph 1 (i) has a source of power independent of the power operating other gyroscopic instruments.
  - 4 A gyro-magnetic type of remote indicating compass installed to meet the requirements of subparagraph 1 (c) (ii) of this Appendix may be considered also to meet the requirement for a heading indicator specified in subparagraph 1 (h) of this Appendix, provided that such installation complies with the power supply requirements of paragraph 3 of this Appendix.

## Appendix V

### Electric lighting equipment flight under the Instrument Flight Rules at night (including night V.M.C.)

The electric lighting equipment is:

#### 1 Instrument illumination

illumination for all instruments and equipment, used by the flight crew, that are essential for the safe operation of the aircraft. The illumination shall be such that:

- (a) all illuminated items are easily readable or discernible, as applicable; and
- (b) its direct or reflected rays are shielded from the pilot's eyes; and
- (c) its power supply is so arranged that in the event of the failure of the normal source of power, an alternative source is immediately available; and
- (d) it emanates from fixed installations.

#### 2 Intensity control

means of controlling the intensity of the illumination of instrument lights, unless it can be demonstrated that non-dimmed instrument lights are satisfactory under all conditions of flight likely to be encountered.

#### 3 Landing lights

2 landing lights except that, in accordance with the provisions of regulation 308 of the Regulations, aircraft engaged in private and aerial work operations and charter operations not carrying passengers for hire and reward are exempted from this requirement provided that 1 landing light is fitted.

*Note* A single lamp having 2 separately energised filaments may be approved as meeting the requirement for 2 landing lights.

#### 4 Passenger compartment lights

lights in all passenger compartments.

#### 5 Pilots' compartment lights

means of lighting the pilots' compartment to provide illumination adequate for the study of maps and the reading of flight documents.

#### 6 Position and anti-collision lights

equipment for displaying the lights prescribed in regulation 196 of the Regulations.

*Note* In accordance of the provision of subregulation 195 (1) of the Regulations, position and anti-collision lights shall be displayed at night and in conditions of poor visibility.

#### 7 Emergency lighting

emergency lighting as specified in (*Civil Aviation Regulations 1998*) Part 39-105 AD/General/4B Amdt 3 and a shock-proof electric torch for each crew member at the crew member station.



## **Appendix VI**

### **Instruments required for Visual Flight Rules operations — helicopters**

- 1 The flight and navigational instruments required are:
  - (a) an airspeed indicating system; and
  - (b) a pressure altimeter with a readily adjustable pressure datum setting scale graduated in millibars; and
  - (c)
    - (i) a direct reading magnetic compass; or
    - (ii) a remote indicating magnetic compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating hours, minutes and seconds. This may be carried on the person of the pilot or navigator.
- 2 In addition to the instruments required under paragraph 1, helicopters engaged in regular public transport, charter or aerial work operations and operating under the Visual Flight Rules, shall be equipped with:
  - (a) a slip indicator; and
  - (b) an outside air temperature indicator when operating from or to a location at which ambient air temperature is not available from ground-based instruments.

## Appendix VII

### Instruments required for Instrument Flight Rules operations in helicopters (except night V.M.C.)

- 1 The flight and navigational instruments required in a helicopter which is required to be operated by 2 pilots are:
  - (a) 2 airspeed indicators together with 1 airspeed indicating system with means of preventing malfunction due to either condensation or icing; and
  - (b) 2 sensitive pressure altimeters; and
  - (c) (i) a direct reading magnetic compass; or  
(ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds; and
  - (e) 2 instantaneous vertical speed indicators; and
  - (f) an outside air temperature indicator; and
  - (g) 2 attitude indicators (artificial horizons) having a 5 inch dial presentation and a standby attitude indicator positioned so as to be usable by the pilot in command and plainly visible by both pilots by day and by night; and
  - (h) a heading indicator (directional gyroscope); and
  - (i) 2 slip indicators; and
  - (j) provision to indicate whether the power supply to the gyroscopic instruments is working satisfactorily.
- 2 The minimum flight and navigation instruments required in a helicopter which is operated by a single pilot are:
  - (a) an airspeed indicating system with means of preventing malfunction due to either condensation or icing; and
  - (b) 2 sensitive pressure altimeters; and
  - (c) (i) a direct reading magnetic compass; or  
(ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds; and
  - (e) instantaneous vertical speed indicator; and
  - (f) an outside air temperature indicator; and
  - (g) an attitude indicator having a 5 inch dial presentation and a standby attitude indicator positioned so as to be usable by the pilot; and
  - (h) a heading indicator (directional gyroscope); and
  - (i) a slip indicator; and
  - (j) provision to indicate whether the power supply to the gyroscopic instruments is working satisfactorily.
- 3 The instruments specified in subparagraphs 1 (a), (b) and (e) and 2 (a), (b) and (e) of this Appendix shall be capable of being connected to more than 1 static source or shall be connected to a balanced pair of flush static ports. Instruments and equipment other than mandatory flight instruments shall not be connected to the static system that operates the instruments used by the pilot in command.
- 4 The instruments specified in subparagraphs 1 (h) and 2 (h) shall have a duplicated source of power supply.

- 5 The 5 inch dial attitude indicators specified in subparagraphs 1 (g) and 2 (g) shall have duplicate sources of power supply. The standby attitude indicator shall have a power source independent of the electrical generating system and shall operate independent of any other attitude indicating system installed.
- 6 The standby attitude indicator installation specified in subparagraphs 1 (g) and 2 (g) shall be one in which:
  - (a) the indicator complies with US Technical Standard Order C4c or equivalent specification acceptable to CASA; and
  - (b) the indicator and its lighting will continue to operate for 30 minutes following the failure of the electrical power generating system without any action by the flight crew; and
  - (c) the position size and lighting of the instrument display allows its use from the pilot in command's operating station by day and by night; and
  - (d) the operation is independent of other attitude indicator installations.
- 7 CASA may, having regard to the type of helicopter, approve an attitude indicator incorporated in an automatic pilot system as being 1 of the 2 attitude indicators required by subparagraph 1 (g) of this Appendix.
- 8 A gyro-magnetic type of remote indicating compass installed to meet the requirements of subparagraph 1 (c) (ii) and 2 (c) (ii) of this Appendix may be considered also to meet the requirement for a heading indicator specified in subparagraph 1 (h) or 2 (h) of this Appendix, provided that such installation complies with the power supply requirements of paragraph 4 of this Appendix.
- 9 CASA may, having regard to the type of helicopter, and the flight presentation, response and acuity standard of the instrument concerned, approve the use of attitude indicators which have a dial presentation of less than 5 inches, in lieu of the indicators specified at paragraphs 1 (g), 2 (g) and 5 of this Appendix.

## **Appendix VIII**

### **Instruments required for night V.M.C. flight in helicopters except while engaged in agricultural operations**

- 1 The flight and navigational instruments required are:
  - (a) an airspeed indicating system; and
  - (b) a sensitive pressure altimeter; and
  - (c)
    - (i) a direct reading magnetic compass; or
    - (ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds. This may be carried on the person of the pilot or navigator; and
  - (e) an outside air temperature indicator; and
  - (f) an attitude indicator (artificial horizon); and
    - (i) standby attitude indicator; or
    - (ii) turn indicator; and
  - (g) a heading indicator (directional gyroscope); and
  - (h) a slip indicator; and
  - (i) a vertical speed indicator; and
  - (j) means of indicating whether the power supply to the gyroscopic instruments is working satisfactorily.
- 2 For operations onto vessels or platforms at sea by night an instantaneous vertical speed indicator is required in place of the vertical speed indicator specified at paragraph 1 (i) of this Appendix.
- 3 The attitude indicator and standby attitude indicator or turn indicator as specified in paragraph 1 (f) of this Appendix, shall have separate and independent power sources.
- 4 A gyro-magnetic type of remote indicating compass installed to meet the requirements of subparagraph 1 (c) (ii) of this Appendix may be considered also to meet the requirement for a heading indicator specified in subparagraph 1 (g) of this Appendix, provided that such installation complies with the power supply requirements of paragraph 3 of this Appendix.

## **Appendix IX**

### **Instruments required for helicopters engaged in night V.M.C. agricultural operations**

- 1 The flight and navigational instruments required are:
  - (a) an airspeed indicating system; and
  - (b) a sensitive pressure altimeter; and
  - (c)
    - (i) a direct reading magnetic compass; or
    - (ii) a remote indicating compass and a standby direct reading magnetic compass; and
  - (d) an accurate timepiece indicating the time in hours, minutes and seconds. This may be carried on the person of the pilot or navigator; and
  - (e) an outside air temperature indicator; and
  - (f) an attitude indicator (artificial horizon); and
  - (g) a vertical speed indicator; and
  - (h) a slip indicator; and
  - (i) a means of indicating whether the power supply to the gyroscopic instrument is working satisfactorily.

## **Appendix X**

### **Instruments required for manned free balloons and hot air airships for flight by day under the Visual Flight Rules**

- 1 The flight and navigational instruments required for flight under the visual flight rules by day are:
  - (a) an altimeter, with a readily adjustable pressure datum setting scale graduated in hectopascals; and
  - (b) a timepiece, which may be carried on the person of the pilot, that is accurate to and readable to the nearest minute for the duration of the flight; and
  - (c) a vertical speed indicator; and
  - (d) in the case of a hot air airship that has a maximum permissible forward airspeed less than that attainable with the engine(s) operating at full power, an instrument capable of indicating when the maximum speed is reached; and
  - (e) in the case of a hot manned free balloon or hot air airship, an envelope temperature indicator; and
  - (f) in the case of a hot air manned free balloon or a hot air airship, a free air temperature indicator or an air temperature indicator that provides readings convertible to free air temperature; and
  - (g) in the case of a pressurised hot air airship, an internal pressure indicator.

## Appendix XI

### Approved equipment configuration — conditions for approval

- 1 An equipment configuration is approved only if it meets all of the conditions set out in this Appendix.
- 2 It is a condition of approval that the ADS-B transmitting equipment must be of a type that is:
  - (a) authorised:
    - (i) by the FAA in accordance with TSO-C166 as in force on 20 September 2004 or a later version as in force from time to time; or
    - (ii) by CASA in accordance with ATSO-C1004 as in force on 2 October 2003 or a later version as in force from time to time; or
    - (iii) by CASA in accordance with ATSO-C1005 as in force on 22 December 2004 or a later version as in force from time to time; or
  - (b) otherwise authorised by CASA for this purpose.
- 3 It is a condition of approval that, on and after 28 June 2012, the geographical position transmitted by the ADS-B transmitting equipment must be determined by:
  - (a) a GNSS receiver of a type that is authorised by the FAA in accordance with TSO-C145a or TSO-C146a as in force on 19 September 2002 or a later version as in force from time to time; or
  - (b) another system authorised by CASA for this purpose.
- 4 It is a condition of approval that the pressure altitude transmitted by the ADS-B transmitting equipment must be determined by:
  - (a) a barometric encoder of a type that is authorised by:
    - (i) the FAA in accordance with TSO-C88a as in force on 18 August 1983 or a later version as in force from time to time; or
    - (ii) the EASA in accordance with ETSO-C88a as in force on 24 October 2003 or a later version as in force from time to time; or
  - (b) another system authorised by CASA for this purpose.
- 5 It is a condition of approval that, unless otherwise approved in writing by CASA, the ADS-B transmitting equipment must:
  - (a) allow the pilot to activate and deactivate it during flight; and
  - (b) transmit the current aircraft address.

*Note* The requirement in paragraph 5 (a) is met if the ADS-B transmitting equipment has a cockpit control that enables the pilot to turn the ADS-B transmissions on and off.

## Notes to Civil Aviation Order 20.18

### Note 1

The Civil Aviation Order (in force under the *Civil Aviation Regulations 1988*) as shown in this compilation comprises Civil Aviation Order 20.18 amended as indicated in the Tables below.

#### Table of Orders

Year and number	Date of notification in <i>Gazette</i> / registration on FRLI	Date of commencement	Application, saving or transitional provisions
2004 No. R19	8 December 2004	8 December 2004 (see s. 2)	
2005 No. 1	FRLI 27 January 2005	28 January 2005 (see s. 1)	
2005 No. 3	FRLI 18 March 2005	19 March 2005 (see s. 1)	
CAO 20.18 2007 No. 1	FRLI 18 June 2007	19 June 2007 (see s. 2)	
CAO 20.18 2009 No. 1	FRLI 5 March 2009	6 March 2009 (see s. 2)	

#### Table of Amendments

ad. = added or inserted   am. = amended   rep. = repealed   rs. = repealed and substituted

Provision affected	How affected
s. 20.18	rs. 2004 No. R19
subs. 2 (definitions)	ad. 2005 No. 1
subs. 9	am. 2005 No. 1; am. 2005 No 3
subs. 9B	ad. CAO 20.18 2007 No. 1 rs. CAO 20.18 2009 No. 1
Appendix XI	ad. CAO 20.18 2007 No. 1 rs. CAO 20.18 2009 No. 1