Manual of Standards Part 172—Air Traffic Services

Version 2.2

made under regulation 172.022 of the

Civil Aviation Safety Regulations 1998

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Manual of Standards Part 172—Air Traffic Services

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FOREWORD

Suggested changes to this MOS may be sent to CASA by:

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CHAPTER 1: INTRODUCTION

Section 1.1: General

1.1.1 Background

1.1.1.1 This Manual of Standards is made under regulation 172.022 in Part 172 of the *Civil Aviation Safety Regulations 1998*. Part 172 refers to the standards and methods to be used in regulating:

(a) how an entity becomes an ATS service provider, and includes:

(i) the functions of ATS providers;

(ii) who can provide these services;

(b) what is required to accompany an application for an ATS Provider's Certificate;

(c) the requirements and standards for compliance, including:

(i) the Operations Manual;

(ii) aircraft separation;

(iii) the provider's organisation, facilities and equipment, personnel, and check and training system, interface arrangements, safety management system and records; and

(d) discontinuance of the service.

1.1.2 Document Set

1.1.2.1 The document hierarchy consists of:

(a) the *Civil Aviation Act 1988* (the ***Act***); and

(b) the *Civil Aviation Safety Regulations 1998* (***CASRs***); and

(c) this Manual of Standards (***MOS***); and

(d) Advisory Circulars (***ACs***).

1.1.2.2 The Act establishes the Civil Aviation Safety Authority (***CASA***) with functions relating to civil aviation, in particular the safety of civil aviation, and related purposes.

1.1.2.3 **CASRs** establish the regulatory framework (Regulations) within which all service providers must operate.

1.1.2.4 The MOS comprises specifications (standards) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation. In those parts of the MOS where it is necessary to establish the context of standards to assist in their comprehension, the sense of parent regulations has been reiterated. The MOS is a disallowable legislative instrument. This means that it is a legislative instrument that becomes effective following registration on the Federal Register of Legislative

Instruments (FRLI). It must be tabled in both Houses of Parliament within 6 sitting days following registration and is subject to scrutiny and disallowance by Parliament.

1.1.2.5 Readers should understand that in the circumstance of any perceived disparity of meaning between MOS and CASRs, primacy of intent rests with the regulations. Where there is any inconsistency between the regulations and the MOS, the regulations prevail.

1.1.2.6 Service providers must document internal actions (Rules) in their own operational manuals, to ensure the maintenance of and compliance with standards.

1.1.2.7 **AC**s are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means of complying with the Regulations. ACs may explain certain regulatory requirements by providing interpretive and explanatory materials. It is expected that service providers will document internal actions in their own operational manuals, to put into effect those, or similarly adequate, practices.

1.1.3 Differences Between ICAO Standards and those in MOS

1.1.3.1 Notwithstanding the above, where there is a difference between a standard prescribed in ICAO documents and the Manual of Standards (MOS), the MOS standard shall prevail.

1.1.4 Differences Published in AIP

1.1.4.1 Differences from ICAO Standards, Recommended Practices and Procedures are published in AIP Supplement.

1.1.5 MOS Documentation Change Management

1.1.5.1 The Air Transport Operations Group has responsibility for the technical content of this MOS.

1.1.5.2 This MOS is issued, and may only be amended, under the authority of the CEO and Director of Aviation Safety of CASA.

1.1.5.3 Suggested changes to this MOS may be given to the Head, Regulatory Development Branch, Legal Services Group (see contact details in the Foreword).

1.1.5.4 Requests for any change to the content of this MOS may come from:

(a) technical areas within CASA; or

(b) aviation industry service providers or operators; or

(c) individuals or authorisation holders.

1.1.5.5 The need to change standards in this MOS may arise for any of the following reasons:

(a) to ensure safety;

(b) to ensure standardisation;

(c) to respond to changed CASA standards;

(d) to respond to ICAO prescription;

(e) to accommodate proposed initiatives or new technologies.

1.1.5.6 CASA may approve trials of new procedures or technologies to develop appropriate standards.

1.1.6 Related Documents

1.1.6.1 These standards should be read in conjunction with:

(a) CASR Part 172;

(b) ICAO Annex 10 – Aeronautical Telecommunications, Volume II – Communications Procedures;

(c) ICAO Annex 11 – Air Traffic Services;

(d) ICAO Annex 15 – Aeronautical Information Services;

(e) ICAO Air Traffic Services Planning Manual (Doc 9426);

(f) ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) (Doc 4444);

(g) ICAO Regional Supplementary Procedures (Doc 7030);

(h) Australian Aeronautical Information Publication (AIP);

(i) Australian Aeronautical Information Publication (AIP) Supplement.

Section 1.2: Abbreviations and Definitions

1.2.1 Abbreviations

1.2.1.1 Unless otherwise stated, abbreviations in this MOS have the meanings given in the AIP or as follows:

Abbreviation	Meaning
ADS-B	Automatic dependent surveillance — broadcast
ADS-C	Automatic dependent surveillance — contract
ATC	Air traffic control
ATS	Air traffic service
HPL	Horizontal protection limit
MLJ	Military low jet
NIC	Navigation integrity category
NUC_P	Navigational uncertainty category — position

Abbreviation	Meaning
PRF	Positive radio fix
PS	Position symbol
SIL	Surveillance integrity limit

1.2.2 Definitions

1.2.2.1 Unless otherwise stated, words in this MOS have the meanings given in the AIP or as follows:

Definition	Meaning
ADS-C agreement	A reporting plan which establishes the conditions of ADS-C data reporting (i.e. data required by the air traffic services unit and frequency of ADS-C reports which have to be agreed to prior to the provision of air traffic services).
ATS surveillance service	Term used to indicate an air traffic service provided directly by means of an ATS surveillance system.
ATS surveillance system	A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft. **Note** A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to, or better than, monopulse SSR.
Automatic dependent surveillance — broadcast	A means by which aircraft, aerodrome vehicles and other objects can automatically transmit or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.
Automatic dependent surveillance — contract	A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.
Fatigue	See section 4.02.
Fatigue risk management system, or FRMS	See section 4.02.
Flight path monitoring	The use of ATS surveillance systems for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path, including deviations from the terms of their air traffic control

Definition	Meaning
	clearances. **Note** Some applications may require a specific technology, e.g. radar, to support the function of flight path monitoring.
Identification	The situation which exists when the position indication of a particular aircraft is seen on a situation display and positively identified by ATC.
Position indication	The visual indication, in non-symbolic or symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object.
Position symbol	The visual indication in symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object obtained after automatic processing of positional data derived from any source.
Positive radio fix	(a) An NDB or locator site (when propagation is normal); or (b) A VOR, TACAN site or marker beacon.
Procedural control	Term used to indicate that information derived from an ATS surveillance system is not required for the provision of air traffic control service.
Procedural separation	The separation used when providing procedural control.
PSR blip	The visual indication, in non-symbolic form, on a situation display, of the position of an aircraft obtained by primary radar.
Radar approach	An approach in which the final approach phase is executed under the direction of a controller using radar.
Radar clutter	The visual indication on a situation display of unwanted signals.
Safety case	A safety case provides documented evidence and argument that a service or facility, or a proposed change to the design of a service or facility, meets safety objectives or levels for the service or facility.
Situation display	An electronic display depicting the position and movement of aircraft and other information as required.
SSR response	The visual indication, in non-symbolic form, on a situation display, of a response from an SSR transponder in reply to an interrogation.

Definition	Meaning
Vectoring	Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.
VFR-on-top	An IFR flight with ATC authorisation to operate in VMC at or below FL180 in Class E airspace at any appropriate VFR altitude or flight level.

1.2.2.2 In addition, see section 4.02 for other definitions in this instrument of words and phrases appearing in Chapter 4 (Fatigue Management).

CHAPTER 2: OPERATIONS MANUAL

Section 2.1: General

2.1.1 Introduction

2.1.1.1 An Operations Manual shows how and where an ATS provider provides, or proposes to provide, air traffic services.

2.1.2 Content of the Operations Manual

2.1.2.1 An operations manual must contain:

(a) a table of contents based on the items in the manual, indicating the page number on which each item begins;

(b) a description of the provider's organisational structure and a statement setting out the functions that the provider performs, or proposes to perform under CASR Part 172;

(c) a description of the chain of command established, or proposed to be established, by the provider and a statement of the duties and responsibilities of any supervisory positions within the organisational structure;

(d) a statement showing how the provider determines the number of operational staff required including the number of operational supervisory staff;

(e) a list of the air traffic services that the provider provides, or proposes to provide;

(f) a statement for each air traffic service, showing the hours of operation of the service;

(g) a statement, for each air traffic service, that identifies the particular airspace within which the service is provided, or proposed to be provided;

(h) a statement, for each air traffic service, that identifies the location from where the service is provided, or proposed to be provided;

(i) if the provider provides, or proposes to provide, an air traffic service for a controlled aerodrome:

(i) a description of the manoeuvring area of the aerodrome; and

(ii) copy of the parts of the aerodrome emergency plan, set out in the aerodrome operator's aerodrome manual that are relevant to the provision of the service; and

(iii) a copy of the procedures set out in the aerodrome operator's aerodrome manual for preventing the unauthorised entry of persons or things onto the manoeuvring area of the aerodrome; and

(iv) a copy of the procedures set out in the aerodrome operator's aerodrome manual for the control of surface vehicles operating on or in the vicinity of the manoeuvring area;

(j) a statement of the responsibilities and functions for each operating position;

(k) a description of the arrangements made or proposed to be made by the provider to ensure that it has, and will continue to receive, on a daily basis, the information necessary for providing the service;

(l) a description of the arrangements made or proposed to be made by the provider to ensure that it has, and will continue to be able to provide, information in connection with its air traffic services to another person whose functions reasonably require that information (includes SAR alerting);

(m) a description of the provider's document and record keeping system;

(n) a copy of any agreement entered into by the provider in relation to the provision of any of the air traffic services;

(o) a copy of the document that sets out the provider's safety management system;

(oa) the details of the provider's fatigue risk management system;

(p) a copy of the provider's contingency plan;

(q) a copy of the provider's security program;

(r) a description of the processes and documentation used to present to staff the relevant standards, rules and procedures contained in ICAO Annexes 10 and 11, ICAO PANS-ATM, ICAO Regional Supplementary Procedures, Chapter 10 of this MOS, and any of the provider's site-specific instructions for the provision of air traffic services;

(s) a description of the processes and documentation used to provide operational instructions to staff;

(t) a description of the procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;

(u) a description of the provider's training and checking program;

(v) a description of the procedures to be used in commissioning new facilities, equipment and services;

(w) the procedures to be followed for revising the operations manual.

Note: For paragraph (oa), Chapter 4 provides for the requirement for an ATS provider to have and implement a fatigue risk management system (FRMS).

CHAPTER 3: ATS FACILITIES AND EQUIPMENT

3.01 Scope of Chapter 3

This Chapter:

(a) is made for regulation 172.095 of CASR; and

(b) sets out standards for facilities and equipment used to provide an air traffic service.

3.02 Definitions

In this Chapter:

ICAO Doc. 4444 means *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444, PANS-ATM) approved and published by decision of the Council of the International Civil Aviation Organization, as in force from time to time, subject to the differences mentioned in Gen 1.7 of Part 1 of the AIP.

visual surveillance system has the same meaning as in ICAO Doc. 4444.

3.03 Control towers

Visibility standards

(1) A control tower for a controlled aerodrome must be designed, oriented and equipped to enable a controller to maintain visual observation, achieved through direct out-of-the-window observation, or indirect observation using a visual surveillance system that meets the requirements of section 3.05, of:

(a) all parts of the manoeuvring area at the aerodrome for which the controller has responsibility; and

(b) the runway strips associated with the areas mentioned in paragraph (a); and

(c) the parts of any service roads that are within 150 m of a runway for which the controller has responsibility; and

(d) any other parts of the aerodrome movement area for which the controller has responsibility; and

(e) aircraft in flight at, or in the vicinity of, the aerodrome.

Note See the definition of ***manoeuvring area*** in the Act and the Part 139 Manual of Standards. The terms ***runway strip*** and ***movement area*** are defined in the CASR Dictionary.

Glare, reflection and noise

(2) The control tower must be designed, oriented and equipped such that the impacts of glare, reflection and noise on a controller performing duties in the tower are minimised.

Signal lamp

(3) The control tower must have the facilities, and access to equipment, necessary to enable white, red and green light signals to be directed from a prominent place on the aerodrome.

Note Also, subregulation 172.095 (3) of CASR provides that equipment and facilities mentioned in Chapter 6 of Annex 11 to the Chicago Convention must meet the standards of that chapter.

3.04 Detecting movement of departing aircraft at controlled aerodromes

General application—control towers commissioned after July 2000

(1) Subsection (4) applies in relation to a control tower for a controlled aerodrome if the control tower was first commissioned after 1 July 2000.

Delayed application for old control towers—modified runways

(2) On and after 20 March 2025, subsection (4) applies to a control tower for a controlled aerodrome in relation to a runway at the aerodrome, if:

(a) the control tower is not a tower mentioned in subsection (1); and

(b) the runway is modified after 1 July 2000; and

(c) as a result of the modification, a controller's ability to maintain visual observation of the runway, or to detect the movement of a departing aircraft after the aircraft has commenced its take-off run, has been degraded.

Delayed application for old towers—new runways

(3) Also, on and after 20 March 2025, subsection (4) applies to at a control tower for a controlled aerodrome in relation to a runway at the aerodrome, if:

(a) the control tower is not a tower mentioned in subsection (1); and

(b) the runway was first commissioned after 1 July 2000.

"Five-second" rule

(4) The control tower must be designed, oriented and equipped to enable a controller to detect the movement of a departing aircraft:

(a) as soon as possible after the aircraft has commenced its take-off run; but

(b) no later than 5 seconds after the take-off run commences.

3.05 Visual surveillance systems providing aerodrome control service

An ATS provider may use a visual surveillance system, in the provision of aerodrome control service, to perform a function listed in Section 7.1 of ICAO Doc. 4444, only if the visual surveillance system meets the standards mentioned in Section 7.12 of ICAO Doc. 4444.

Note 1 Section 7.1 of ICAO Doc. 4444 lists functions of aerodrome control towers. Under subregulation 172.075 (1) of CASR, an ATS provider must ensure that any traffic service that it provides is provided in accordance with the procedures and rules set out in ICAO Doc. 4444, as varied by Gen 1.7 of Part 1 of the AIP.

Note 2 The term ***aerodrome control service*** has the same meaning as in Annex 11 (see the definition of the term in the CASR Dictionary).

Note 3 As a system that processes or displays air traffic control data, a visual surveillance system is a ***telecommunication service*** as defined in regulation 171.012 of CASR. A visual surveillance system, therefore, is also regulated under Part 171 of CASR as a telecommunication service, including how CASA approves a person to be a provider of the service, and obligations of providers.

3.06 Displays for control towers

(1) A control tower must have the following displays:

(a) flight data displays (for example, flight progress boards);

(b) meteorological displays which provide at least the following information:

(i) surface wind;

(ii) barometric pressure;
(iii) temperature;
(iv) if the aerodrome has runway visual range equipment—the current runway visual range values;

(c) operational data displays for the following:
(i) other significant weather information;
(ii) NOTAMs;
(iii) handover/takeover;
(iv) essential aerodrome information;
(v) relevant maps and charts;

(d) a time display at each operational position.

(2) For the purposes of subparagraph (1) (b) (i), if more than one surface wind sensor is used at the aerodrome, the displays must identify the sensor being used for the observation.

3.07 Control towers—requirements about aerodrome equipment and navigation aids

Switching, monitors and controls for aerodrome equipment

(1) A control tower for a controlled aerodrome must have appropriate switching, monitors and controls for lighting equipment installed at the aerodrome, including for the following equipment:
(a) runway lighting;
(b) approach lighting;
(c) taxiway lighting;
(d) visual approach slope indicator systems;
(e) stop bars;
(f) obstacle lighting;
(g) illuminated wind direction indicator;
(h) aerodrome beacon.

Navigation aids

(2) The control tower must have a means to readily recognise the failure of any navigation aid being used for the control of aircraft.

Note Subsection (2) covers both ground-based and space-based navigation aids.

3.08 Area and approach control units

(1) Area control centres and approach control units must have the following facilities:
(a) time display at each operational position;
(b) flight data displays;
(c) operational data displays;
(d) appropriate maps and charts.

Note Annex 11 also contains provisions regulating facilities in relation to area and approach control units. Subregulation 172.095 (3) of CASR requires that equipment and facilities mentioned in Chapter 6 of Annex 11 that an ATS provider uses in providing an air traffic service must comply with the standards of that chapter.

(2) Area control centres and approach control units must have a means to readily recognise the failure of any navigation aid being used for the control of aircraft.

Note 1 Also, subregulation 172.095 (3) of CASR provides that equipment and facilities mentioned in Chapter 6 of Annex 11 to the Chicago Convention must meet the standards of that chapter.

Note 2 Subsection (2) covers both ground-based and space-based navigation aids.

CHAPTER 4: FATIGUE MANAGEMENT

4.01 Scope of Chapter 4

This Chapter sets out requirements for the management of fatigue in the provision of air traffic services by an ATS provider.

4.02 Definitions

In this instrument:

duty means any task that a person who is employed by an ATS provider as an operational person is required to carry out by the ATS provider, including tasks performed during time-in-position, administrative tasks and training.

duty period means a period of time which:

(a) starts when an operational person is required by an ATS provider to report for, or commence, duties; and

(b) ends when that person is free of all duties.

fatigue, for an operational person, means a physiological state of reduced alertness or capability to perform mental or physical tasks, which:

(a) may impair the ability of the person to perform the person's safety-related duties; and

(b) is caused by one or more of the following:

(i) the person's lack of sleep;

(ii) the person's extended wakefulness;

(iii) the person's circadian phase at any time;

(iv) the person's workload of mental activities, or physical activities, or mental and physical activities at any relevant time.

fatigue risk management system, or ***FRMS***, means a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles, knowledge and operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

FRMS manager means the person in an ATS provider's organisation who is appointed by the chief executive officer of the organisation to be responsible for the day-to-day implementation, management and continuing effectiveness of the ATS provider's fatigue risk management system.

non-duty period means a continuous and predefined period of time during which an operational person is free of all duties associated with the person's employment.

operational person, in relation to an ATS provider, means a member of the ATS provider's personnel to whom the ATS provider gives responsibility:

(a) for an air traffic control function to be performed in connection with an air traffic service it provides; or

(b) for a flight service function to be performed in connection with an air traffic service it provides.

Note Under regulation 172.120 of CASR, an ATS provider must not give responsibility to a person for an air traffic control function, or a flight service function, unless the person is qualified as mentioned in that regulation or is under the supervision of a person who is qualified as mentioned.

Part 65 Manual of Standards means the Manual of Standards issued by CASA under regulation 65.033 of CASR, as in force from time to time.

Note See the definition of ***Manual of Standards*** in regulation 65.010 of CASR.

time-in-position, for an operational person, means a period of time which:

(a) starts when the person starts performing an air traffic control function, or flight service function; and

(b) ends when the person stops performing the function.

4.03 General condition on ATS provider's approval under Subpart 172.F

For the purposes of regulation 11.068 of CASR, it is a condition of the approval under Subpart 172.F of CASR, of a person as an ATS provider, that the ATS provider must:

(a) comply with each requirement for the ATS provider set out in this Chapter; and

(b) comply with the limits and requirements for an operational person, as provided for by the ATS provider's FRMS; and

(c) ensure that each of the ATS provider's operational persons, when acting as such, complies with each requirement imposed by section 14.02 or 14.03 of the Part 65 Manual of Standards on the person's ATC licence or flight service licence.

Note Section 14.02 of the Part 65 Manual of Standards imposes a condition on an ATC licence that requires the holder of the licence not to carry out an air traffic control function if, due to fatigue, the holder is, or is likely to be, unfit to perform the task. Section 14.03 of that Manual of Standards imposes a condition in similar terms for holders of flight service licences.

4.04 ATS provider's obligations

Fitness for duty

(1) An ATS provider must not assign a duty to an operational person to perform an air traffic control function, or a flight service function, if the ATS provider reasonably believes that the operational person is unfit to perform the function because of fatigue.

Limits

(2) The limits and requirements that apply to an ATS provider's operational persons must be determined in accordance with the ATS provider's FRMS.

4.05 Requirement for fatigue risk management system

(1) An ATS provider must have a fatigue risk management system that:

(a) is appropriate for the size, nature and complexity of the ATS provider's operations; and

(b) includes each of the elements mentioned in subsection (2); and

(c) on and after 1 September 2024, is approved for implementation by CASA under section 4.13 or 4.14.

(2) For paragraph (1)(b), the elements are as follows:

(a) the policy and objectives, and related documentation, in accordance with section 4.07;

(b) the practical operating procedures in accordance with section 4.08;

(c) the hazard identification, risk assessment and mitigation procedures in accordance with section 4.09;

(d) the safety assurance procedures in accordance with section 4.10;

(e) the safety promotion procedures in accordance with section 4.11;

(f) the change management procedures in accordance with section 4.12.

Note See also subsection 6.1.1 (about safety management systems). Paragraph 6.1.1.1(i) requires the provider's safety management system (SMS) to include processes for integrating the FRMS with the SMS.

4.06 Application for approval of FRMS

(1) The ATS provider may apply to CASA for:

(a) a trial FRMS implementation approval; or

(b) a full FRMS implementation approval.

Note An ATS provider is not eligible for a full implementation approval until the FRMS has been in effective operation for at least 12 months from the date of a trial implementation approval: see section 4.14.

(2) For a trial or full FRMS implementation approval:

(a) an FRMS must include CASA approval of each of the elements of the FRMS mentioned in subsection 4.05(2); and

(b) CASA must be satisfied that the FRMS is integrated with the ATS provider's safety management system.

(3) Before CASA issues a trial FRMS implementation approval, CASA must be satisfied that the FRMS:

(a) comprises all of the elements mentioned in subsection 4.05(2); and

(b) is a safe, data-driven system which appears to be reasonably capable of continuously and effectively monitoring and managing fatigue-related safety risks using scientific principles and knowledge, and operational experience; and

(c) will enable the ATS provider to assess the extent to which operational persons and other relevant personnel perform at levels of alertness sufficient to ensure the safety of operations.

(4) Before CASA issues a full FRMS implementation approval, CASA must be satisfied that the FRMS:

(a) comprises all of the elements mentioned in subsection 4.05(2); and

(b) is a safe, data-driven system which will continuously and effectively monitor and manage fatigue-related safety risks using scientific principles and knowledge, and operational experience; and

(c) will enable the ATS provider to ensure that operational persons and other relevant personnel perform at levels of alertness sufficient to ensure the safety of operations.

4.07 FRMS policy and documentation

(1) The ATS provider must have an FRMS policy that refers to all the elements of the FRMS mentioned in subsection 4.05(2).

(2) The policy must require that all the operations to which the FRMS applies be clearly defined in the operations manual.

(3) The policy must:

(a) make it clear that while primary responsibility for the FRMS lies with the ATS provider, its effective implementation requires shared responsibility by management, operational persons, and any other relevant personnel; and

(b) clearly indicate the safety objectives of the FRMS; and

(c) be approved in writing by the chief executive officer of the ATS provider's organisation; and

(d) be accessible to all relevant areas and levels of the organisation in a way that indicates the ATS provider's specific endorsement of the policy; and

(e) declare management commitment to:

(i) effective safety reporting; and

(ii) provision of adequate resources for the FRMS; and

(iii) continuous improvement of the FRMS; and

(f) require that clear lines of accountability are identified for management, operational personnel, and all other relevant personnel; and

(g) require periodic reviews to ensure the policy remains relevant and appropriate.

(4) The policy must:

(a) be in a written statement; and

(b) require that each other element of the FRMS mentioned in subsection 4.05(2) be described in a written statement.

(5) In addition to the requirements under subsection (4), and the relevant limits and procedures contained in the operations manual in accordance with this Chapter, the FRMS must also be supported by the following documentation, namely, up-to-date identification, description and records of the following:

(a) the personnel accountabilities, responsibilities and authorities for effective implementation of the FRMS, including the FRMS Manager;

(b) the mechanisms for ongoing involvement in fatigue risk management of management, operational personnel, and all other relevant personnel;

(c) the FRMS training programs, training requirements and records of attendance at training;

(d) scheduled and actual duty and non-duty periods and break periods between periods of time-in-position in a duty period with significant deviations and reasons for deviations noted;

(e) the FRMS outputs, including findings from collected data, and recommendations and actions taken.

Note An ATS provider's operations manual must contain the details of the FRMS: see paragraph 2.1.2.1(oa).

4.08 FRMS practical operating procedures

(1) The FRMS practical operating procedures must set out:

(a) maximum values for each operational person for the following:

(i) the number of hours in a duty period;

(ii) the number of consecutive work days;

(iii) the number of hours worked in a defined period;

(iv) the time-in-position in a duty period; and

(b) minimum values for each operational person for the following:

(i) the duration of a non-duty period;

(ii) the number of non-duty days required in a defined period;

(iii) the duration of breaks between periods of time-in-position in a duty period.

Note The terms ***duty period*** and ***non-duty period*** are defined in section 4.02.

(2) For the purposes of subsection (1), the values for each operational person must be based on scientific principles and knowledge and subject to safety assurance processes.

(3) If an ATS provider acquires data from an FRMS which indicates that the maximum and minimum values required under paragraphs (1)(a) and (b) are too high or too low, respectively, the ATS provider must amend the FRMS (in accordance with the requirements of section 4.12) to ensure that these values are acceptable.

(4) The procedures may provide that a maximum or minimum value mentioned in subsection (1) can be varied to address sudden and unforeseen operational circumstances, if:

(a) the ATS provider records:

(i) the reason for the deviation; and

(ii) the extent of the deviation; and

(iii) the date and time when the deviation took place; and

(b) the ATS provider carries out a safety assessment which demonstrates that any associated risks will be managed to ensure a level of safety equivalent to that which would exist if no deviation from the values had occurred.

4.09 FRMS hazard identification, risk assessment and mitigation procedures

FRMS hazard identification procedures

(1) FRMS hazard identification procedures must be based on the following processes for fatigue-related hazard identification:

(a) the predictive process;

(b) the proactive process;

(c) the reactive process.

(2) The predictive process must be capable of identifying fatigue-related hazards by examining the scheduling of operational persons and taking into account the following:

(a) factors known to affect sleep;

(b) factors known to affect fatigue;

(c) the effects of the factors mentioned in paragraphs (a) and (b) on an operational person’s performance.

(3) The proactive process must be capable of identifying fatigue-related hazards within current operations.

(4) The reactive process must be capable of identifying the contribution of fatigue-related hazards to actual events that could have affected, or did affect, safety, with a view to determining how the effects of fatigue on each event could have been minimised.

FRMS risk assessment procedures

(5) FRMS risk assessment procedures must be capable of determining the following:

(a) the probability of events occurring or circumstances arising that create a fatigue-related hazard;

(b) the potential severity of fatigue-related hazards;

(c) when the safety risks associated with paragraph (a) or (b) require mitigation.

(6) For the purposes of subsection (5), the FRMS risk assessment procedures must ensure that identified fatigue-related hazards are examined in relation to the following:

(a) the relevant operational context and procedures in which the identified fatigue-related hazard arose;

(b) the probability of the fatigue-related hazard arising in those circumstances;

(c) the possible consequences of the fatigue-related hazard in those circumstances;

(d) the effectiveness of existing safety procedures and controls.

FRMS risk mitigation procedures

(7) FRMS risk mitigation procedures for each fatigue-related hazard must be capable of:

(a) selecting appropriate mitigation strategies for the hazard; and

(b) implementing the selected mitigation strategies; and

(c) monitoring the implementation and effectiveness of the strategies.

4.10 FRMS safety assurance procedures

(1) FRMS safety assurance procedures must provide for:

(a) continuous monitoring of the performance of the FRMS; and

(b) the analysis of fatigue-related trends; and

(c) measurements to validate the effectiveness of mitigation strategies.

(2) FRMS safety assurance procedures must include a formal process for managing changes to the FRMS arising from:

(a) the identification of changes in the operational environment that may affect the management of fatigue risks; and

(b) the identification of changes within the ATS provider's organisation that may affect the management of fatigue risks.

(3) The FRMS safety assurance procedures must include a formal process to assess:

(a) what impact a change mentioned in paragraph (2)(a) or (b) may have on the effective performance of the FRMS; and

(b) for such a change—what amendment, change or modification may be needed to the FRMS to ensure its continued effective performance.

(4) FRMS safety assurance procedures must provide for the continuous improvement of the FRMS, by including the following:

(a) the elimination or modification of fatigue-related risk controls that:

(i) have had unintended negative consequences; or

(ii) are no longer required because of changes in the ATS provider's operational or organisational environment;

(b) routine evaluations of facilities, equipment, documentation and procedures to determine their implications for fatigue-related risk management and control;

(c) identification of emerging fatigue-related risks to allow the introduction of new procedures and procedures to mitigate such risks.

4.11 FRMS safety promotion procedures

(1) FRMS safety promotion procedures for fatigue-related hazards must include training and communication programs capable of supporting and continuously improving all elements of the FRMS in the delivery of optimum safety levels.

(2) For the purposes of subsection (1), FRMS safety promotion procedures must include the following:

(a) training programs for management, operational persons, and all other relevant personnel to ensure competency levels commensurate with the role and responsibility of the person under the FRMS;

(b) an effective FRMS communication plan that:

(i) explains all elements of the FRMS to management, operational persons, and all other relevant personnel; and

(ii) describes the communication channels which they must use to gather, disseminate and apply FRMS-related information.

4.12 FRMS change management procedures

(1) For this section, ***significant change*** means:

(a) any increase to the values required under paragraph 4.08(1)(a); and

(b) any decrease to the values required under paragraph 4.08(1)(b); and

(c) any other change to any element of the FRMS that does not maintain or improve, or is not likely to maintain or improve, aviation safety.

(2) The ATS provider must have FRMS change management procedures that clearly indicate how the ATS provider will amend, change or modify any element of the FRMS, consistently with the applicable requirements of this section.

(3) Subsections (4), (5) and (6) apply on and after 1 September 2024.

(4) The ATS provider must not make a significant change to any element of the FRMS unless an application to make the change is approved in writing by CASA.

(5) An application for approval of a significant change must:

(a) be in writing; and

(b) set out the change; and

(c) be accompanied by a copy of the part of the ATS provider's FRMS documentation affected by the change, clearly identifying the change.

(6) An ATS provider must not make a change to the FRMS that is not a significant change unless:

(a) the ATS provider's FRMS change management procedures provide for non-significant changes; and

(b) the ATS provider makes the change in accordance with its procedures; and

(c) the ATS provider has given CASA written notice of the change and a copy of the amended part of the ATS provider's operational manual clearly identifying the change.

Note Under regulation 172.300 of CASR, CASA may direct an ATS provider to amend its operations manual (which must include the details of the provider's FRMS: see paragraph 2.1.2.1(oa) of this Manual of Standards).

CASA may issue a direction to an ATS provider under regulation 11.245 of CASR if the matter affects the safe navigation and operation of aircraft. Under paragraph 11.245(2)(a), CASA must be satisfied that it would be necessary to do so in the interests of the safety of air navigation. This could include a direction to the ATS provider to amend, change or modify the FRMS.

4.13 Trial FRMS implementation approval

(1) CASA may, on a written application made by an ATS provider, issue the ATS provider with a trial FRMS implementation approval for up to 24 months, if CASA is satisfied that each element of the ATS provider's FRMS:

(a) complies with and meets the requirements, attributes and characteristics of an FRMS under this Chapter; and

(b) is capable of delivering:

(i) identified safety outcomes; and

(ii) fatigue-risk data and reports; and

(iii) continuous improvement in the delivery of safety outcomes.

(2) CASA may extend the duration of an approval issued under subsection (1):

(a) on application by the ATS provider; or

(b) on CASA's own initiative, if CASA considers that aviation safety requires a longer trial FRMS implementation approval period before a full FRMS implementation approval.

(3) For the purposes of subsection (2), CASA can extend the duration of a trial FRMS implementation approval by issuing a new trial FRMS implementation approval.

4.14 Full FRMS implementation approval

(1) CASA may, on a written application made by an ATS provider, issue the ATS provider with a full FRMS implementation approval, if the ATS provider:

(a) has held a trial FRMS implementation approval for a period of at least 12 months; and

(b) satisfies CASA, through relevant data and reports, that the FRMS:

(i) is demonstrably delivering the safety outcomes expected when the trial FRMS implementation approval was given; and

(ii) is capable of delivering continuous improvement in the delivery of safety outcomes.

(2) If CASA decides not to issue the ATS provider with a full FRMS implementation approval, the ATS provider may apply again to CASA for a trial FRMS implementation approval under section 4.13.

CHAPTER 5: TRAINING AND CHECKING PROGRAM

Section 5.1: General

5.1.1 Introduction

5.1.1.1 This Chapter sets out the standards for a Training and Checking program.

5.1.2 Program

5.1.2.1 A Training and Checking program must ensure that an individual performing a function in conjunction with any air traffic services is competent to perform that function.

5.1.2.2 Processes which address the integrity of staff training must be defined, documented and maintained.

5.1.3 Competency

5.1.3.1 In summary, an individual is competent if that individual is:

(a) licensed, where the function can only be performed by the holder of a licence;

(b) rated, where the function can only be performed by the holder of an appropriate rating;

(c) endorsed, where the function can only be performed by the holder of an appropriate endorsement;

(d) qualified, where the function can only be performed by the holder of an appropriate qualification;

(e) trained and proven to be proficient in the performance of functions that are not covered by sub-paragraphs (a) to (d) above; and

(f) recent in the performance of the function and knowledge and skills in emerging matters identified as essential to task performance.

Note: Competency standards for licensed functions are contained in CASR Part 65.

5.1.4 Training Courses

5.1.4.1 The term ‘training course’ has wide application and includes all training for a particular competency required for the provision of an air traffic service and includes training on new equipment.

5.1.4.2 Training courses must be provided on the basis of a MOS Part 65 requirement, or training needs analysis or similar method.

5.1.4.3 The training programs for each course must be comprehensive and facilitate achievement of training goals through a syllabus which reflects required competencies. The syllabus must ensure compliance with relevant national

and international requirements and CASA competency-based training standards.

5.1.4.4 Training courses must use a method of delivery consistent with ANTA requirements for an RTO, using facilities and instructors, or training officers, with current expertise and identified qualifications appropriate to achieving the goals of the course.

5.1.4.5 The method of assessment, both theoretical and practical, must utilise qualified assessors and appropriate processes and facilities and must be consistent with CASR Part 65.

5.1.5 Emergency Training

5.1.5.1 Emergency training to specifically prepare a candidate for unforseen circumstances must form part of all training courses.

5.1.6 Refresher Training

5.1.6.1 Refresher training is part of the Training and Checking program. It involves periodic training and assessment of individuals performing functions in air traffic services in those competencies (knowledge and skills) which are essential, but infrequently or rarely used (e.g. abnormal and emergency operations, degraded equipment modes, contingency plan implementation). The content and periodicity of refresher training must be sufficient to ensure competency.

5.1.7 On-going Training

5.1.7.1 The training and checking program must provide for on-going training, as necessary, to ensure that staff are competent in the use of new or emerging standards, procedures, techniques, facilities and equipment identified as essential to task performance.

5.1.8 Remedial Training

5.1.8.1 The training and checking program must have a process which identifies deficiencies in knowledge or application, and must have a process to ensure these deficiencies are rectified.

5.1.9 Checking

5.1.9.1 The purpose of checking is to ensure that the individual subject to the check meets the competency standards specified in CASR Part 65, and the ATS provider’s own standards where these are additional to CASR Part 65. Checks must be carried out as required by CASR Part 65.

5.1.10 Qualifications of Trainers and Checkers

5.1.10.1 Persons carrying out training and/or checking functions must be appropriately qualified for the functions as required by CASR Part 65.

CHAPTER 6: SAFETY MANAGEMENT SYSTEM

Section 6.1: General

6.1.1 Features of Safety Management System

6.1.1.1 A safety management system must have the following elements:

(a) the ATS provider's safety policy and objectives;

(b) the organisational and staff responsibilities for safety matters;

(c) the establishment of the levels of safety that apply to the services, and the monitoring of the levels of safety achieved;

(d) the process for internal safety reviews;

(e) the process for the internal reporting and management of safety concerns and incidents;

(f) the process for the identification, assessment, control and mitigation of existing and potential safety hazards in service provision;

(g) the definition of the interface arrangements, for safety management and related responsibilities and procedures, with internal functional groups and with aerodrome operators and support service providers;

(h) the processes for the management of changes to existing services;

(i) the processes for integrating the ATS provider's fatigue risk management system (the FRMS) into the safety management system.

Note 1: Guidelines for the preparation of a safety management system are published by CASA in Advisory Circular AC 172-01, as existing from time to time.

Note 2: For subparagraph (i), Chapter 4 provides for an ATS provider to have and implement a fatigue risk management system for the management of fatigue in its provision of air traffic services.

6.1.2 Safety Case Preparation

6.1.2.1 A safety case must be based on a recognised methodology for safety risk assessment.

6.1.2.2 The safety risk assessment in a safety case must:

(a) identify all potential safety hazards associated with the operation of each service, in normal and abnormal modes of operation; and

(b) assess the safety risk of each hazard; and

(c) identify the means of mitigation of unacceptable safety risks.

Note Guidelines for the preparation of safety cases are published by CASA in Advisory Circular AC 172-2.

6.1.2.3 An existing air traffic service or facility that has a demonstrated history of safe operation for at least 2 years before the date of initial certification does not need to be covered by a baseline safety case.

6.1.2.4 A safety case must be prepared to support a new service or a proposed change to an existing service:

(a) the effect of which would be that the service would no longer be in accordance with the certificate issued to the ATS provider under regulation 172.275 of CASR; or

(b) that requires prior notification to CASA because of a requirement to do so in the ATS provider's safety management system.

Note An internal safety assessment for a change that does not constitute a variation to a service provider's approval is undertaken in accordance with a service provider's safety management system.

CHAPTER 7: CONTINGENCY PLANS

Section 7.1: General

7.1.1 Introduction

7.1.1.1 This Chapter sets out the standards for contingency plans in the provision of air traffic services.

7.1.1.2 A contingency plan must describe in detail the actions that operational staff are to follow to maintain safety in the event of the failure or non-availability of staff, facilities or equipment which affects the provision of air traffic services. The plan must also cover procedures for the safe and orderly transition back to full service provision.

7.1.2 Minimum Contents

7.1.2.1 A contingency plan must include to the extent of the particular services authorised on the provider's certificate, but is not limited to, arrangements for the following:

(a) airspace management:

(i) transfer of responsibility;

(ii) redesignation;

(iii) emergency traffic;

(b) air traffic flow management;

(c) air traffic separation;

(d) alternatives for the continuing provision of the services (e.g. alternative operating positions or ATS units);

(e) alternative services (e.g. traffic information);

(f) SAR alerting;

(g) information transfer/coordination;

(h) notifications to affected parties;

(i) letters of agreement with other providers on any of the above matters;

(j) restoration of staff, facility or equipment to normal levels;

(k) measures to test the suitability of the plan;

(l) staff training requirements to ensure the plan can be safely implemented.

CHAPTER 8: SECURITY PROGRAM

Section 8.1: General

8.1.1 Introduction

8.1.1.1 This Chapter sets out the standards for a security program.

8.1.2 Security Measures

8.1.2.1 A security program must specify the physical security measures, and the procedures to be followed for the purpose of:

(a) preventing and detecting intentional and unintentional damage to any personnel, facility or equipment used by the provider in providing an air traffic service;

(b) responding to a threat of intentional and unintentional damage to a facility or equipment used by the provider in providing an air traffic service; and

(c) preventing unauthorised people from having access to any facility or equipment used by the provider in providing an air traffic service.

CHAPTER 9: DOCUMENTS AND RECORDS

Section 9.1: General

9.1.1 Documents

9.1.1.1 A document control system covers the authorisation, standardisation, publication, distribution and amendment of all documentation issued by the organisation, or required by the organisation for the provision of air traffic services.

9.1.1.2 These processes must ensure:

(a) authorisation is by a designated authority appropriate to the management and safety accountability structures;

(b) currency can be readily determined;

(c) availability at locations where needed by ATS personnel;

(d) only current versions are available;

(e) a master copy is securely held;

(f) archival where superseded.

9.1.1.3 **Reference Materials.** For the purposes of sub-regulation 172.160(g), the manuals and documents to be maintained are the following:

(a) manuals for equipment used by staff in the provision of air traffic services;

(b) the relevant sections of the Aerodrome Emergency Plan (aerodrome services only).

9.1.2 Records

9.1.2.1 A system for records covers identification, collection, indexing, storage, security, maintenance, access and disposal of records necessary for the provision of air traffic services.

9.1.2.2 Records systems must provide an accurate chronicle of ATS activities for the purpose of reconstruction of events for air safety investigation, and for system safety analysis.

9.1.3 Records to be Kept

9.1.3.1 **Automatic recordings.** The following items used for the provision of air traffic services must be recorded automatically and retained for the period shown:

(a) direct pilot-controller two-way radiotelephony or datalink communications—30 days;

(b) direct-speech or data link between air traffic services units—30 days;

(c) surveillance data from primary and secondary radar equipment or obtained through ADS—14 days;

(d) automated flight data processing including on-screen display of aircraft tracks and label blocks—14 days (consistency with sub-paragraph (c) above).

> **Note:** Where possible, provision of synchronous integration of radar and on-screen data with related voice recordings should be facilitated. (ICAO Air Traffic Services Planning Manual, Chapter 8.4).

9.1.3.2 **Time injection.** Automatic recordings must have a means of establishing accurately the time, in hours/minutes/seconds, at which any recorded event occurred.

9.1.3.3 **Document records.** The following items must be kept for a minimum of 30 days (ICAO Air Traffic Services Planning Manual):

(a) ATS messages, including flight plans;

(b) flight progress strips or documents of a similar nature used for the recording of flight data and the issue of clearances, instructions and directions;

(c) transcripts of automated weather broadcasts (e.g. ATIS);

(d) log books;

(e) handover/takeover details, including, if not electronically recorded, the identification of the person taking over.

9.1.3.4 **Additional items.** Records of the following additional items must be kept for a minimum of 5 years:

(a) details of interruptions to services;

(b) details of failures of equipment used for the provision of air traffic services;

(c) details of facility unavailability;

(d) staff duty rosters;

(e) details of actions carried out under the Safety Management System including follow-up corrective and preventative actions;

(f) directions and instructions issued to staff for the provision of air traffic services;

(g) technical manuals used for the provision of air traffic services.

9.1.3.5 **Personnel Licensing Records.** Records of ATS personnel licensing and competency certification under CASR Part 65 must be kept for a minimum of 7 years, including after an employee ceases to be employed by the ATS provider. This includes details of:

(a) training;

(b) renewal and currency of ratings, endorsements and qualifications; and

(c) other proficiencies required by the ATS provider to be demonstrated.

9.1.3.6 **Record retention for investigation.** Where requisitioned, by an appropriate authority, for the purposes of investigation, records must be isolated and kept in a secure place until their release by that authority.

9.1.4 Maintaining Records

9.1.4.1 Records must not be completed in anticipation of the recorded action being completed.

9.1.4.2 Deletions from communications records are not permitted. All entries must be written in non-erasable ink, and must be legible.

9.1.4.3 Non-active forms or strips on which an error is noted may be replaced. Active forms or strips, fault reports, records and Log Books must be changed, or errors corrected by:

(a) drawing a line through the incorrect data and writing the correct data adjacent thereto; or

(b) cancelling the old and rewriting the record, retaining both the old and the new for later reference purposes.

9.1.4.4 **Methods of recording.** Information transmitted or received by verbal means must be recorded by electronic means in accordance with CASR Part 172. Voice records must be supported by one or more of the following methods:

(a) writing on a flight progress strip;

(b) typewritten on authorised forms;

(c) teletyped on page copy machine units;

(d) handwritten in accordance with local requirements;

(e) handwritten on appropriate forms;

(f) entered directly into computer-based equipment.

9.1.4.5 **Flight notifications.** A copy of all flight notifications received must be held for 90 days. Printed flight notifications shall be filed with the day's traffic. Electronic records shall be archived via a suitable "off-line" media such as tape, disk array or optical disk.

9.1.5 Maintaining Operational Log Books

9.1.5.1 The Log Book must be used to record all significant occurrences and actions relating to operations, facilities, equipment and staff at an ATS unit.

> **Note:** Except when forms such as fault reports or Air Safety Incident Reports (ASIRs) must also be completed, duplication of information should be avoided.

9.1.5.2 A working record or Log Book entry must not be inserted between earlier entries. In the event of an out of sequence entry being necessary, it must be

entered as soon as possible, and annotated that it is out of sequence with an explanatory note as to why it is out of sequence.

9.1.5.3 All Log Book entries must be recorded against the times of the occurrence, or time of the Log Book entry.

9.1.5.4 **Minimum information to be recorded.** The minimum information to be recorded is shown in the following table.

Occasion	Information
At the commencement of each day's operation	• UTC date and time; • Where required, identification of the unit and/or the operating position. **Note:** these may be incorporated in the station date stamp.
On assuming responsibility for a position	• The UTC date and time of assuming responsibility for a position and the signature of the officer commencing duty (see also voice recordings); • Results of equipment checks; • Result of time check.
During operation of the unit	• Air Safety Incidents, including accidents and breaches of the Regulations such as non-compliance with ATC instructions; **Note:** This is in addition to the completion of incident reporting actions. • Actions taken in relation to any SAR activity including distress communications; • General notes concerning essential aerodrome information, such as the results of aerodrome inspections, closure of sections of the manoeuvring area caused by works or natural phenomena, etc.; • Times of aerodrome closure and reopening, with reasons for the closure; • Change in status of facilities, service or procedure including communication difficulties and tests; • Short term changes in staffing or hours of coverage, including variations to required staffing levels; • Any dispensation given against the Regulations • Status of navigation aids.
Handover/takeover (where a separate form is not provided and kept as a record)	• A resume of outstanding action and unusual operations which are current or anticipated, relating to the traffic display and/or SAR activity; • The status of communications and equipment; • The time of handover/takeover, against the signatures of the officers involved.
Closure of unit and/or position	• Time of closure and conditions and actions relating to the closure, followed by changes to equipment status, and any outstanding action; • The time of intended reopening, and the signature of the officer closing the unit/position.

9.1.6 Voice and Data Recording

9.1.6.1 Where appropriate voice recording facilities are available, instead of being recorded as entries in a Log Book, the information mentioned in subsection 9.1.6.1A must be voice recorded in sufficient detail to readily establish for any safety investigation:

(a) whether and when the position or unit was active or inactive; and

(b) the identity of each person responsible for any active position at any time.

9.1.6.1A The information that must be voice recorded is:

(a) the identification of incoming staff taking over responsibility for a position; and

(c) the information relayed by outgoing staff to incoming staff in accordance with handover and takeover procedures; and

(d) for non-continuous units — details of opening and closing watch, including the identification of incoming staff taking over responsibility for the unit.

9.1.6.2 When an automatic voice recording facility fails, a manual record of communications must be maintained, to the extent that this is possible.

CHAPTER 10: STANDARDS FOR THE PROVISION OF AIR TRAFFIC SERVICES

Section 10.1: General

10.1.1 Purpose

10.1.1.1 This Chapter contains the standards, rules and procedures for the provision of air traffic services that are additional to, or expand upon, or specify additional conditions for, the standards, rules and procedures contained in ICAO Annex 11, PANS-OPS Volume II, ICAO Doc 8168, ICAO Doc 7030 and ICAO PANS-ATM Doc 4444.

10.1.2 Air Traffic Services Commensurate with Airspace Classification

10.1.2.1 Unless otherwise authorised by CASA, air traffic services must be provided commensurate with the airspace classifications as notified in the AIP.

10.1.3 Traffic Priorities

10.1.3.1 Aircraft in a state of emergency must be given priority over all other traffic.

10.1.4 Relaxation of Speed Restrictions

10.1.4.1 Subject to subsection 10.1.4.2, in providing an air traffic service in Class D airspace, including a Class D CTR, ATC may permit an aircraft to exceed the 200 KT Class D airspace speed limit.

> **Note** The 200 KT speed limit for Class D airspace is a CASA direction to pilots under subregulation 99AA (5) of the *Civil Aviation Regulations 1988*.

10.1.4.2 After taking account of air traffic conditions, ATC may permit:

(a) a maximum speed limit of 250 KT; or

(b) if the pilot in command of an aircraft informs ATC that a speed greater than 250 KT is an operational requirement — a maximum speed limit of greater than 250 KT.

10.1.5 SARWATCH for IFR Aircraft conducting VFR Operations

10.1.5.1 The unit providing an ATS to an IFR aircraft must provide a SARWATCH service for the aircraft if it is conducting any of the following:

(a) a departure, climb or descent under the VFR;

(b) a VFR-on-top procedure.

10.1.5.2 Subsection 10.1.5.1 does not apply if the pilot in command has expressly cancelled the IFR flight plan.

> **Note** SARWATCH service is a function of the flight plan, not of the particular procedure being flown at the relevant time.

Section 10.2: ATS surveillance systems

10.2.1 Use of ADS-B surveillance

10.2.1.1 ADS-B may only be used for the provision of air traffic control service if the quality of the ADS-B data is demonstrably suitable for the particular purpose.

10.2.2 Operation of ADS-B transmitters

10.2.2.1 If the situation display shows that the aircraft identification transmitted by an ADS-B-equipped aircraft is different from that expected from the aircraft, ATC must ask the pilot to confirm aircraft identification.

10.2.2.2 If, after a pilot has been instructed to operate the aircraft's ADS-B transmitter on an assigned aircraft identification or to change call sign, the aircraft identification shown on the situation display is different from that assigned to the aircraft, ATC must ask the pilot to re-enter the assigned aircraft identification.

10.2.2.3 If the identification of an aircraft as shown on the situation display is different from that assigned to the aircraft, and a request under subsection 10.2.2.2 has not resolved the discrepancy, ATC must ask the pilot to confirm that the correct aircraft identification has been selected.

10.2.2.4 If the discrepancy continues following confirmation by the pilot that the correct aircraft identification has been set on the ADS-B identification feature, ATC must:

(a) tell the pilot of the persistent discrepancy; and

(b) if possible, correct the label showing the aircraft identification on the situation display; and

(c) tell the next control position and any other interested unit using ADS-B for identification purposes of the erroneous aircraft identification transmitted by the aircraft.

10.2.3 Verification of level information

10.2.3.1 The tolerance value for pressure altitude-derived level information displayed to the controller is ±200 ft. Geometric height information must not be used for separation.

10.2.3.2 ATC must verify displayed pressure altitude-derived level information:

(a) on initial contact with an aircraft or, if this is not feasible, as soon as possible after initial contact; and

(b) by simultaneous comparison with:

(i) altimeter-derived level information received from the same aircraft by radiotelephony; or

(ii) at an aerodrome — the aerodrome elevation during the take-off roll, if the level information subsequently indicates a positive climb after take-off.

10.2.3.3 If aircraft pressure altitude-derived level information is within the approved tolerance value, the pilot need not be advised of the verification. Geometric height information must not be used to determine if altitude differences exist.

10.2.3.4 If the displayed level information is not within the approved tolerance value or if a discrepancy greater than the approved tolerance value is detected after verification, ATC must tell the pilot of this and ask the pilot to check the pressure setting and confirm the aircraft's level.

10.2.3.5 If the discrepancy continues to exist after confirmation of the correct pressure setting, ATC must:

(a) ask the pilot to stop Mode C or ADS-B altitude data transmission, if this does not cause the loss of position and identity information, and tell the next control position or ATC unit for the aircraft of the action taken; or

(b) tell the pilot of the discrepancy and ask that the operation continue in order to prevent loss of position and identity information of the aircraft, if possible, override the label displayed level information with the reported level and tell the next control position or ATC unit for the aircraft of the action taken.

10.2.4 Determination of level occupancy using ATS surveillance system-derived level information

10.2.4.1 **Aircraft maintaining a level.** An aircraft is taken to be maintaining its assigned level as long as the pressure altitude-derived level information indicates that it is within ±200 ft of the assigned level.

10.2.4.2 **Aircraft vacating a level.** An aircraft cleared to leave a level is taken to have commenced its manoeuvre and vacated the previously occupied level when the pressure altitude-derived level information indicates a change of 400 ft or more in the anticipated direction from its previously assigned level.

10.2.4.3 **Aircraft passing a level in climb or descent.** An aircraft in climb or descent is taken to have passed a level when the pressure altitude-derived level information indicates that it has passed this level in the required direction by 400 ft or more.

10.2.4.4 **Aircraft reaching a level.** An aircraft is taken to have reached the level to which it has been cleared when the greater of 3 consecutive renewals of display updates or at least 15 seconds have passed since the pressure

altitude-derived level information indicated that it was within ±200 ft of the assigned level.

10.2.5 Establishment of identification

10.2.5.1 Aircraft must be identified by at least 1 of the following procedures:

(a) application of 1 or more of the identification procedures specified in PANS ATM;

(b) correlating a particular position symbol to the position of an aircraft observed visually.

10.2.6 Position information

10.2.6.1 ATC must tell the pilot of an aircraft provided with ATS surveillance service of its position in the following circumstances:

(a) on identification, unless the identification is established:

(i) based on the pilot's report of the aircraft position, or within 1 NM of the runway on departure, if the observed position on the situation display is consistent with the aircraft's time of departure; or

(ii) by use of ADS-B aircraft identification, SSR Mode S aircraft identification or assigned discrete SSR codes if the location of the observed position indication is consistent with the current flight plan of the aircraft; or

(iii) by transfer of identification (see subsection 12.1.7);

(b) when the pilot requests this information;

(c) when the pilot's estimate differs significantly from the controller's estimate based on the observed position;

(d) when the pilot is instructed to resume own navigation after vectoring if the current instructions had diverted the aircraft from a previously assigned route;

(e) immediately before termination of ATS surveillance service, if the aircraft is observed to deviate from its intended route.

10.2.7 Use of Speed Control

10.2.7.1 Speed Control must not be applied to formation flights or fuel critical flights.

10.2.8 Termination of ATS surveillance services

10.2.8.1 When an aircraft exits controlled airspace into an area in which ATS surveillance services will continue, ATC must inform the pilot accordingly.

10.2.9 Obstacle clearance

10.2.9.1 When vectoring, ATC must provide at least 1 000 ft vertical clearance over any obstacle within:

(a) 3 NM of the aircraft when the range scale in not greater than 50 NM; or

(b) 5 NM of the aircraft when the range scale is greater than 50 NM.

10.2.9.2 These obstacle clearance requirements do not apply:

(a) when vectoring as part of an issued SID; or

(b) when ATC authorises a visual departure; or

(c) in VMC by day only, when ATC assigns responsibility for arranging obstacle clearance specifically to the pilot.

10.2.10 Vectoring special VFR

10.2.10.1 Special VFR aircraft may be vectored only if warranted by emergency conditions.

10.2.11 Issuing ATS surveillance system derived distance

10.2.11.1 ATS surveillance system derived distance and appropriate altitude assignments may be issued to an arriving aircraft using a track for which a DME or GPS Arrival procedure is specified, if:

(a) DME is not available; or

(b) a pilot conducting a GPS arrival reports the loss of RAIM.

10.2.11.2 When ATS surveillance system derived distances are used as a substitute for DME or GPS derived distance information, the reference datum being used for the distance information (e.g. DME site) must be displayed on the situation display map.

Section 10.3: Circuits and Runways

10.3.1 Selection of Runway in Use

10.3.1.1 **Use of other than nominated runways.** Controllers must not nominate a particular runway for use if an alternative runway is available, when:

(a) for runway conditions that are completely dry, either:

(i) the cross-wind component for the particular runway, including gusts, exceeds 20 knots; or

(ii) the downwind component for the particular runway, including gusts, exceeds 5 knots;

(b) for runway conditions that are not completely dry, either:

(i) the cross-wind component for the particular runway, including gusts, exceeds 20 knots; or

(ii) there is a downwind component for the particular runway.

10.3.1.2 **Authorising intersection departures.** A controller may authorise a departure from a runway intersection when requested by the pilot or may offer an intersection departure to assist traffic flow. The pilot must be advised

of the remaining runway length if such information is not readily available to the pilot.

10.3.2 Simultaneous Parallel Runway Operations

10.3.2.1 In addition to ICAO PANS-ATM applications, ATC may use parallel runways for Simultaneous Opposite Direction Operations (***SODPROPS***) (see subsection 10.4.8).

10.3.2.2 Whenever parallel runway operations are in progress, pilots must be notified by inclusion of such advice and an expectation of the type of approach or departure on the ATIS.

10.3.2.3 The use of SODPROPS must be broadcast on the ATIS including the runway configuration being used for the procedure.

10.3.2.4 At Class D aerodromes, ATC may authorise simultaneous, same direction operations on:

(a) parallel runways; or

(b) parallel landing areas; or

(c) a runway and a parallel landing area;

only if:

(d) Class D visual meteorological conditions exist, or visual separation between the relevant aircraft is applied; and

(e) 2-way radio communication is maintained with the aircraft involved; and

(f) pertinent traffic information is issued; and

(g) the minimum distance between the runways or landing areas is in accordance with the spacing specified for the categories of aircraft in the following table:

Aircraft	Distance between runway centrelines	Distance between edges of adjacent landing areas or runway and landing area
Single engine, propeller driven	90 m	60 m
Twin engine, propeller driven	150 m	120 m
All others	210 m	180 m

(h) for the table in paragraph (g):

(i) where aircraft of more than 1 category are operating at the same time, the greater or greatest of the minimum distances applies; and

(ii) a landing area includes a glider runway strip.

10.3.2.5 If the parallel runways at a Class D aerodrome do not meet the minimum spacing requirements under paragraph 10.3.2.4 (g), CASA may, in writing, approve simultaneous, same direction operations subject to conditions, if appropriate.

10.3.3 Procedures for Low Visibility Operations

10.3.3.1 When meteorological conditions are such that all or part of the manoeuvring area of a controlled aerodrome cannot be visually monitored from the control tower, ATC must co-operate with the aerodrome operator to initiate measures in accordance with the aerodrome's low visibility procedures (***LVP***).

10.3.3.2 Subject to subsection 10.3.3.3, for a controlled aerodrome, ATC must co-operate with the aerodrome operator to ensure that LVP are fully implemented if either of the following is to take place at the aerodrome:

(a) an instrument approach operation when either:

(i) the reported cloud ceiling is less than the precision approach Category I decision height published in the AIP for the runway to be used; or

(ii) the visibility is less than the precision approach Category I RVR minimum published in the AIP for the runway to be used;

(b) a take-off operation when the reported visibility or RVR on the runway to be used is less than 550 m.

> **Note** When LVP are implemented, the aerodrome operator is required to complete all operator preparations relevant to LVP to commence, and confirm to ATC that these preparations are complete. See also subsection 10.17.3 of Manual of Standards (MOS) – Part 139 Aerodromes.

10.3.3.3 ATC must inform pilots that LVP are in force, but only after:

(a) ATC has verified that LVP at the aerodrome are fully implemented; and

(b) for an aerodrome that supports instrument approach operations with minima less than precision approach Category I — procedures are in place to safeguard the ILS critical or sensitive areas as required for the classification on the ILS and in accordance with subsection 10.3.4.6; and

(c) for an aerodrome that supports localiser-guided take offs — procedures are in place to safeguard the localiser critical and sensitive areas as required for the classification on the ILS and in accordance with subsection 10.3.4.7.

10.3.4 Protecting ILS critical and sensitive areas

10.3.4.1 ATC must not permit a vehicle or personnel within the relevant ILS critical areas during ILS operations.

10.3.4.2 Subject to 10.3.4.3, ATC must not permit an aircraft to be within the relevant ILS critical area if:

(a) the cloud ceiling is at, or below, 600 ft; or

(b) the visibility is 2 000 m or less.

Notes

1. The ***relevant ILS critical area*** means either the critical area appropriate to the largest aircraft that uses the aerodrome, or the critical area appropriate to the particular size and shape of the aircraft or vehicle.
2. An aircraft taking off and passing over the relevant localiser is not taken to be penetrating the relevant localiser critical area.

10.3.4.3 Subject to 10.3.4.4, an aircraft may enter an ILS critical area:

(a) without ATC clearance, while landing or vacating a runway after landing; or

(b) under ATC clearance, provided:

(i) an approaching aircraft has not passed the ILS outer marker; or

(ii) if an outer marker is not available — an approaching aircraft is not within 4 NM of the landing runway threshold.

10.3.4.4 If an aircraft penetrates the critical area when the cloud ceiling is at, or below, 600 ft, or the visibility is 2 000 m or less, ATC must broadcast an appropriate warning to:

(a) any approaching aircraft that have passed the ILS outer marker; or

(b) if an outer marker is not available — any approaching aircraft that are within 4 NM of the landing runway threshold.

10.3.4.5 For subsection 10.3.4.4, ***appropriate warning*** means a warning that there may be ILS signal disturbance due to aircraft penetration of an ILS critical area.

10.3.4.6 If:

(a) an instrument approach operation with minima less than precision approach Category I is conducted at an aerodrome; and

(b) either:

(i) the reported cloud ceiling is less than the instrument approach Category I decision height published in the AIP for the runway to be used; or

(ii) the visibility is less than the precision approach Category I RVR minimum published in the AIP for the runway to be used;

then:

(c) for the **ILS critical area** — once an arriving aircraft has passed the ILS outer marker or, if an outer marker is not available, is within 4 NM of the landing runway threshold, ATC must not permit other aircraft or any vehicle within the relevant ILS localiser or glidepath critical areas; and

(d) for the **ILS sensitive area** — once an arriving aircraft is within 2 NM of the landing runway threshold, ATC must not permit other aircraft or any vehicle within the relevant ILS sensitive area.

10.3.4.7 If an aerodrome that supports a relevant aircraft's localiser-guided take-off has visibility of less than 550 m, ATC must not permit another aircraft or vehicle within the applicable ILS localiser critical and sensitive areas from the time the relevant aircraft has been cleared for take-off until it has completed its take off.

> **Note** Pilots are required to notify ATC of an intention to conduct a guided take-off at start up.

10.3.5 Informing pilots when critical and sensitive areas are not protected

10.3.5.1 If:

(a) ATC is not protecting an ILS critical or sensitive area according to subsections 10.3.4.6 or 10.3.4.7; and

(b) an aircraft advises that an operation mentioned in subsection 10.3.5.2 is to be conducted;

ATC must inform the pilot in command of the aircraft that the relevant ILS critical or sensitive area is not being protected.

10.3.5.2 The operations are the following:

(a) any approach with minima less than precision approach Category I;

(b) autoland procedures;

(c) localiser-guided take-off;

(d) an operation similar to 1 mentioned in paragraphs (a) to (c).

Section 10.4: Departures and Arrivals

10.4.1 Arriving Aircraft

10.4.1.1 To provide for the possibility of radio failure, aircraft under procedural control, cleared to the same holding point or holding points not laterally separated, must not be assigned the same level while flying within 10 MIN of the holding point. However, this requirement does not preclude two arriving aircraft on laterally separated flight paths, which are at least 90 degrees apart, being:

(a) cleared to make simultaneous visual approaches; or

(b) instructed to descend visually to the coordinated common level or different levels when, due to traffic, a visual approach cannot be made provided:

(i) there is no significant cloud at or below the levels assigned to the aircraft;

(ii) visibility is 30 KM or more; and

(iii) both aircraft have been instructed to report at a distance outside the point at which lateral separation would be infringed and at which distance it is known that visual separation can be applied.

10.4.1.2 When a delay of more than 5 minutes is expected, ATC must issue pilots:

(a) when a procedural control service is provided with an expected approach time (EAT); or

(b) when an ATS surveillance service is provided with an expected landing time (ETL).

10.4.5 Independent Parallel Visual Approaches

10.4.5.1 Independent visual approaches may be conducted to parallel runways with centre-lines separated by at least 760 M provided that:

(a) the aircraft are making straight-in approaches commencing at the outer marker or 4 NM from the runway threshold; and

(b) a minimum 1,000 FT vertical or 3 NM radar separation is maintained between aircraft until:

(i) one aircraft is established within the furthest Initial Approach Fix (IAF), when both aircraft are established on their respective localiser in visual conditions; or

(ii) one aircraft is established on the localiser in visual conditions, and the other is established on a heading to intercept final inside the furthest IAF with the runway reported in sight; or

(iii) both aircraft are established on a heading to intercept final inside the furthest IAF with the runway reported in sight; and

(c) when vectoring an aircraft to intercept the final course, ensure that the final vector permits the aircraft to intercept at an angle not greater than 30 degrees.

10.4.5.2 When an independent visual approach is anticipated, ATC must advise pilots on first contact with approach.

10.4.5.3 If a pilot does not report the runway in sight by a position 3 NM from the centre-line of the adjacent parallel runway, the controller may, if necessary, vector the aircraft away from the final approach for sequencing for a dependent approach. The “VISUAL” report is the only report required when established on the localiser.

10.4.6 Dependent Parallel Visual Approaches

10.4.6.1 Dependent visual approaches to parallel runways may be conducted in accordance with the procedures and requirements for visual approaches (see paragraph 12.2.4).

10.4.8 Simultaneous Opposite Direction Parallel Runway Operations

10.4.8.1 Simultaneous Opposite Direction Parallel Runway Operations (SODPROPS) may be conducted subject to the following conditions:

(a) runway centrelines are separated by a minimum of 860 M;

(b) operations are conducted in meteorological conditions equal to, or better than, the minimum radar vectoring level, or the lowest minimum commencement level for instrument approaches to the arrival runway, whichever is lower. (without prior approval, the minima shall not be less than cloud base 2,500 FT and visibility 8 KM, in the arrival and departure sector concerned);

(c) traffic information is passed to conflicting aircraft;

(d) the departure runway course diverges by 15 degrees from the approach course to the other runway.

Section 10.5: Separation Standards — General

10.5.1 Application of Separation Standards

10.5.1.1 The longitudinal, lateral, vertical, time and wake turbulence standards that follow, take precedence over those standards in ICAO PANS-ATM.

10.5.2 Separation of VFR using navigation aids

10.5.2.1 Time separation standards requiring the use of radio aids to determine position must not be applied to VFR flights. However other separation standards may be applied to VFR flights.

10.5.3 Formation or In-company Flights

10.5.3.1 Separation from a formation must be applied to the outer dimensions applicable to the type of formation.

10.5.3.2 Before applying Vertical Separation with a formation, controllers must check the levels of the other formation aircraft as necessary to establish the full vertical extent of the formation.

10.5.3.3 A group of civil aircraft conducting the same flight (e.g. an air safari), which require the aircraft to operate at separation distances greater than those specified for formation flights must be considered to be separate aircraft when applying separation.

10.5.4 Airspace Boundaries

10.5.4.1 Where applicable, separation must be provided from the time an aircraft enters controlled airspace until the time an aircraft leaves controlled airspace. Separation is not required between aircraft within controlled airspace and any aircraft in close proximity but remaining outside controlled airspace.

10.5.4.2 Unless prior coordination has been effected, aircraft must be separated from adjacent sectors by the appropriate separation standard.

10.5.4.3 Except when the transfer of control is to occur, or when coordination has been performed with an adjoining sector, an appropriate tolerance must be applied to system map boundaries to ensure the separation of aircraft operating on either side of the boundary.

10.5.4.4 If an airspace boundary in ATS surveillance system coverage divides 2 sectors, aircraft must not be vectored closer than half the applicable ATS surveillance system horizontal separation minimum from the displayed system map boundary. However, the reduction to half the applicable ATS surveillance system horizontal separation may only be used if:

(a) the adjacent sector, in controlled airspace, has the same ATS surveillance system processing and display system; or

(b) the restricted area flying activity is subject to the ADF:

(i) applying half the applicable ATS surveillance system horizontal separation minimum between aircraft in the restricted area and the restricted area boundary; or

(ii) ensuring that an appropriate navigation tolerance is applied to aircraft operating in the restricted area (i.e. that the aircraft are contained within the restricted area); or

(c) the restricted area non-flying activity is subject to the appropriate tolerances being applied by the restricted area user to ensure containment of the activity within the restricted area.

10.5.4.5 If different ATS surveillance system separation minima apply on either side of a boundary, aircraft must not be vectored closer to the boundary than half the larger of the 2 minima.

10.5.4.6 Unless local agreements are in place, a tolerance of not less than the applicable ATS surveillance system separation minimum must be applied to a system map boundary that divides sectors where one of the sectors is authorised to operate up to the boundary.

10.5.4.7 ATC may treat IFR aircraft or aircraft operating on a special VFR clearance (***relevant aircraft***) operating in Class D airspace as if they are operating under the VFR when:

(a) the relevant aircraft is:

(i) operating in the aerodrome circuit; and

(ii) established on the same radio frequency as the ATC tower; and

(b) the ATC treatment is for the purpose of separating the relevant aircraft from aircraft in adjacent Class C airspace.

10.5.5 Separation minima based on ATS surveillance systems

10.5.5.1 Subject to subsection 10.5.5.3, the horizontal separation minimum based on ATS surveillance information is:

(a) 5 NM; or

(b) if a higher minimum applies under subsection 10.12.2.2 — that higher minimum.

10.5.5.2 Subject to subsection 10.5.5.3, the separation minimum in 10.5.5.1 may be reduced to not less than 3 NM if:

(a) a higher minimum under 10.12.2.2 does not apply; and

(b) the relevant aircraft are in communication with, and under the control of, a terminal control unit or associated control tower; and

(c) an ATS surveillance system and associated display system is in use which is demonstrably suitable for using 3 NM separation.

10.5.5.2A Subject to subsection 10.5.5.3, the separation minimum in 10.5.5.1 may be reduced to not less than 2.5 NM between succeeding aircraft which are established on the same final approach track within 10 NM of the runway end if:

(a) a higher minimum under 10.12.2.2 does not apply; and

(d) the relevant aircraft are in communication with, and under the control of, a terminal control unit or associated control tower; and

(e) an ATS surveillance system and associated display system is in use which is demonstrably suitable for using 2.5 NM separation; and

(f) the average runway occupancy time of landing aircraft does not exceed 50 seconds; and

> **Note:** The average may be established by means such as data collection and statistical analysis, or methods based on a theoretical model or both.

(g) braking action is reported as good and runway occupancy times are not adversely affected by runway contaminants such as slush, snow or ice; and

(h) the aerodrome controller is able to observe the runway-in-use and associated exit and entry taxiways:

(i) visually; or

(ii) by means of surface movement radar (SMR); or

(iii) by means of a surface movement guidance and control system (SMCGS); and

(i) ATC monitors aircraft approach speeds and, where necessary, requires speed adjustments, to ensure that separation is not reduced below the minimum; and

(j) aircraft operators and pilots have been told beforehand that the aircraft must exit the runway in an expeditious manner whenever 2.5 NM separation on final approach is applied; and

(k) procedures concerning the application of 2.5 NM separation at an aerodrome are published in the AIP.

10.5.5.3 Subsections 10.5.5.1 and 10.5.5.2 do not apply for independent or dependent parallel approaches to which a provision of section 6 of PANS ATM, as in force from time to time, applies on and after 27 February 2020.

10.5.5.4 **Separation between aircraft leaving controlled airspace.** ATS surveillance system separation may be applied between aircraft about to leave controlled airspace if:

(a) the horizontal separation is at least 5 NM; and

(b) mutual traffic information is passed to each aircraft before it leaves controlled airspace.

10.5.5.5 **Separation between aircraft within and outside of coverage.** Separation continues to exist between aircraft when 1 of the aircraft has passed out of ATS surveillance coverage if:

(a) when proceeding on the same track — ATS surveillance system separation existed when the leading aircraft passed out of range and procedural separation is established before the following aircraft arrives within 5 NM of the last observed position of the leading aircraft; or

(b) when proceeding on reciprocal tracks — the aircraft in ATS surveillance system coverage has passed the last observed position of the outbound aircraft by the applicable ATS surveillance system separation minimum.

10.5.5.6 ATS surveillance system separation may be provided between an aircraft under ATS surveillance system control and the procedural navigation tolerance appropriate to the clearance issued to an aircraft not under ATS surveillance system control:

(a) until the latter has been identified; and

(b) only if the procedural navigation tolerance is shown on the situation display.

10.5.6 Separation between ADS-C tracks and radar tracks

10.5.6.1 ADS-C may be used to determine separation between FANS-1/A aircraft reporting by ADS-C, between FANS-1/A and non-FANS-1/A aircraft, and between FANS-1/A aircraft and an aircraft identified on radar.

10.5.6.2 The separation standard to be applied in a mixed surveillance environment must be appropriate to:

(a) the communications and navigational capability of the relevant aircraft; and

(b) for separation being applied between FANS-1/A and non-FANS-1/A aircraft — the capabilities of the non-FANS-1/A aircraft.

10.5.6.3 The minimum separation standard between an ADS-C track and a radar track is an appropriate ADS-C separation standard or an appropriate procedural separation standard.

Section 10.6: Separation Standards–Longitudinal

10.6.1 Mach Number Technique

10.6.1.1 Mach number technique may only be applied between jet aircraft with serviceable LRNS, and must not be applied when block level clearances have been approved.

10.6.2 Application of Longitudinal Time Minima

10.6.2.1 The time interval between aircraft must be calculated at the speed of the following aircraft.

10.6.3 Cross Check Calculations

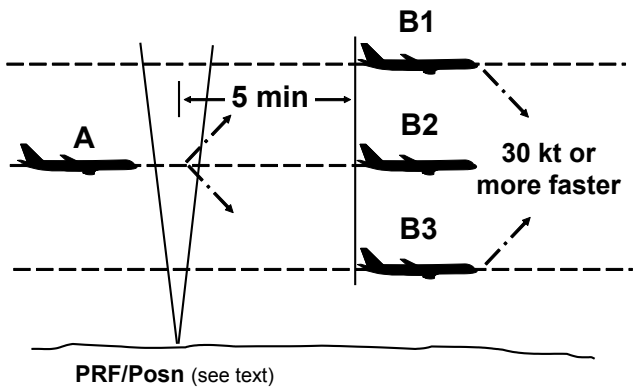
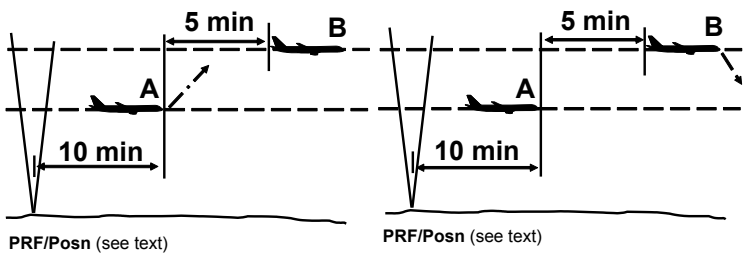
10.6.3.1 Separation requirements must be cross-checked to ensure the integrity of calculations. The cross-check is to validate the initial calculation and to confirm that the calculation is consistent with the traffic disposition.

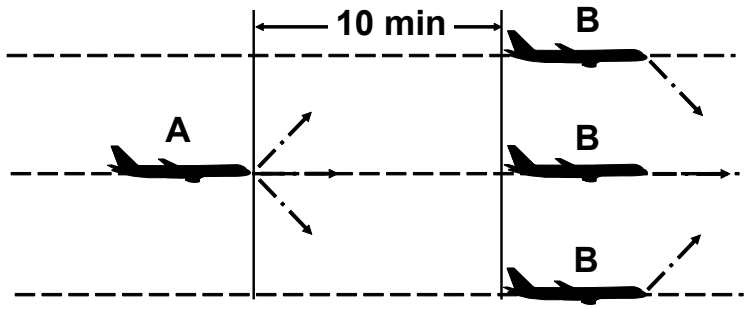
10.6.3.2 The method used to cross-check calculations need to be sufficiently accurate to confirm that the original calculation has merit. Where a significant discrepancy or inconsistency is found:

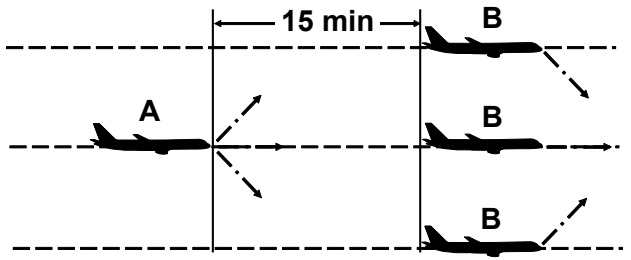
(a) the initial calculation must be performed again and the integrity cross-check reapplied; or

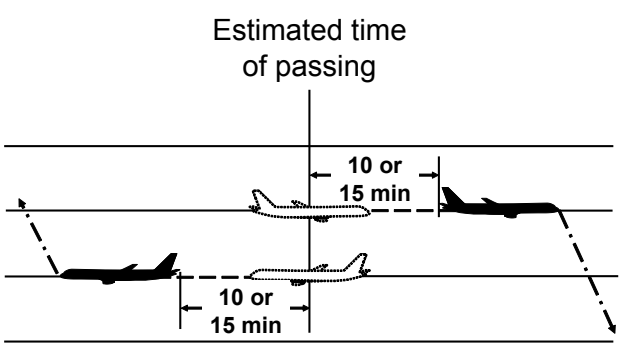
(b) further verification using an alternative means must be performed.

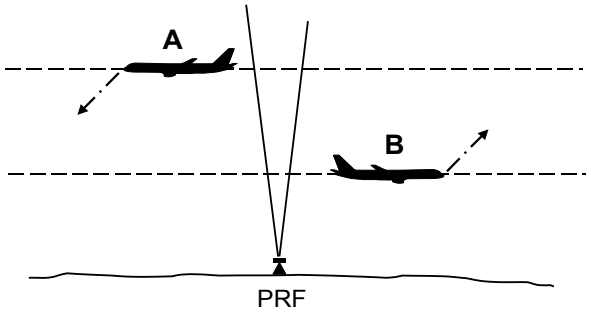
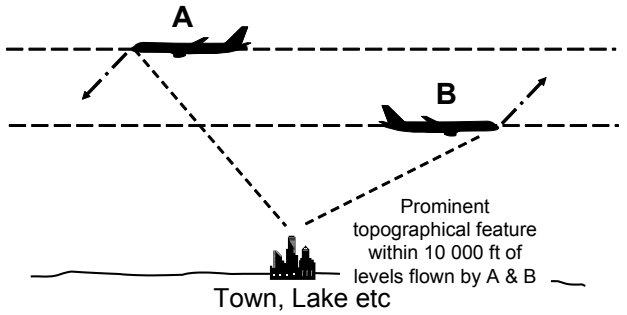
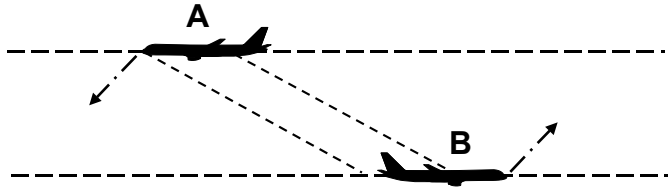
10.6.4 Longitudinal Time Separation Minima

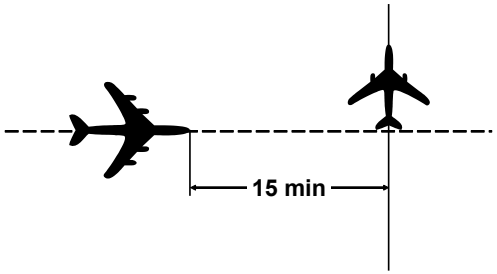
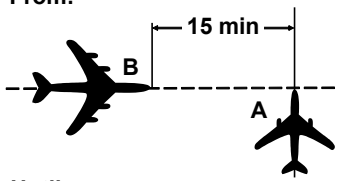
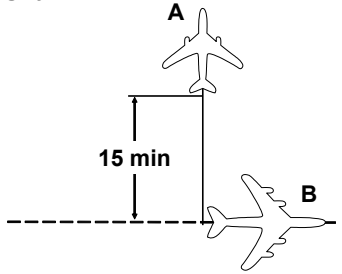
Minima	Application	Conditions	Diagram
T1a **5 min**	Aircraft cruising, climbing or descending	1. B1, B2 or B3 has maintained and will continue to maintain an IAS at least 30 kt greater than A. 2. 5 min separation has been established by the passage of both aircraft over the same positive radio fix, or the same ATS surveillance system position observed by ATC. 3. 1 aircraft maintains level while vertical separation does not exist. 4. The vertical separation at the commencement of the level change does not exceed 4 000 ft.	
T1b **5 min**	Aircraft climbing or descending, where: 1. the preceding aircraft descends through the level of a following aircraft; or 2. the following aircraft climbs through the level of a preceding aircraft	1. No closing speed (IAS or Mach No) exists. 2. The 5 min separation has been established by the passage of both aircraft over the same positive radio fix, or the same ATS surveillance system position observed by ATC. 3. The level change is commenced within 10 min of the time the second aircraft passed over the positive radio fix, or the ATS surveillance system position observed by ATC. 4. 1 aircraft maintains level while vertical separation does not exist. 5. The vertical separation at the commencement of the change does not	

Minima	Application	Conditions	Diagram
		exceed 4 000 ft.	
T1c **5 min**	Aircraft cruising in a continuation of Departure Standard D4	The cruising IAS of the following aircraft is at least 10 kt less than and not more than 90% of the cruising IAS of the preceding aircraft.	
T2 **10 min**	Aircraft cruising, climbing or descending	Frequent determination of position and speed is possible by: 1. use of navigation aids; or 2. use of LRNS (INS/IRS min. G/S 300 kt) or DME on the route sections within: (a) CTA; or (b) OCA as described below: (i) BN VOR – 350 BN (outbound); or (ii) all routes contained in the airspace bounded by: SY VOR – BN VOR – LHI NDB and Lord Howe –Sydney routes; or (iii) PH VOR – 350 PH (outbound); or (iv) POKIP – UPNOT (northbound); or 3. position reports from RNP10 & RNP4 approved aircraft; or 4. visual reference to the ground by day (or night for VFR aircraft).	

<table>
<tr><th>Minima</th><th>Application</th><th>Conditions</th><th>Diagram</th></tr>
<tr><td>T3
15 min</td><td>Aircraft cruising, climbing or descending, within all CTAs and OCAs except when T2 is applicable</td><td></td><td> 
</td></tr>
<tr><td>T4
10 min
Mach No. Technique</td><td>Aircraft cruising, climbing or descending</td><td>The Mach Number Technique is used between aircraft:
(a) on the same track and the aircraft have reported over a common point and 10 min will be maintained until another form of separation is established; or
(b) on converging tracks and it is confirmed that 10 min separation will exist at the point the aircraft enter lateral conflict and 10 min separation will be maintained until another form of separation is established.</td><td>
<table>
<tr><th rowspan="2">Difference in Mach No</th><th colspan="5">Distance to fly and separation (in min) required at entry point</th></tr>
<tr><th>000–600 NM</th><th>601–1200 NM</th><th>1201–1800 NM</th><th>1801–2400 NM</th><th>2401–3000 NM</th></tr>
<tr><td>0.01</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr>
<tr><td>0.02</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td></tr>
<tr><td>0.03</td><td>13</td><td>16</td><td>19</td><td>22</td><td>25</td></tr>
<tr><td>0.04</td><td>14</td><td>18</td><td>22</td><td>26</td><td>30</td></tr>
<tr><td>0.05</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td></tr>
<tr><td>0.06</td><td>16</td><td>22</td><td>28</td><td>34</td><td>40</td></tr>
<tr><td>0.07</td><td>17</td><td>24</td><td>31</td><td>38</td><td>45</td></tr>
<tr><td>0.08</td><td>18</td><td>26</td><td>34</td><td>42</td><td>50</td></tr>
<tr><td>0.09</td><td>19</td><td>28</td><td>37</td><td>46</td><td>55</td></tr>
<tr><td>0.10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Minima</th><th>Application</th><th>Conditions</th><th colspan="2">Diagram</th></tr>
<tr><td rowspan="6">T5
9–5 min
Mach No. Technique</td><td rowspan="6">Aircraft cruising, climbing or descending where opening speed exists using the Mach Number Technique</td><td rowspan="6">1. ATS surveillance system observation or passage over the same, on-track, positive radio fix confirms that the required time interval will exist at the common point.
2. The preceding aircraft is maintaining a greater Mach number than the following aircraft, in accordance with the adjacent table.</td><td>Time</td><td>Mach No</td></tr>
<tr><td>9 min</td><td>Mach 0.02 faster</td></tr>
<tr><td>8 min</td><td>Mach 0.03 faster</td></tr>
<tr><td>7 min</td><td>Mach 0.04 faster</td></tr>
<tr><td>6 min</td><td>Mach 0.05 faster</td></tr>
<tr><td>5 min</td><td>Mach 0.06 faster</td></tr>
<tr><td colspan="5">For T4 and T5, a common point is:
(a) a geographical point on the track over which both aircraft will fly; or
(b) a point along the individual track of each aircraft that is equidistant from the geographical point described in paragraph (a).</td></tr>
<tr><td>T6
10 or 15 min
Aircraft on Reciprocal Tracks</td><td>Aircraft on reciprocal tracks</td><td>1. If lateral separation is not provided, vertical separation must be provided for at least 10 or 15 min, as applicable to the route (see T2 and T3 conditions), before and after the time the aircraft are estimated to pass, or are estimated to have passed.
2. In addition to the T2 conditions for application, the 10 minute time minimum may also be applied between aircraft equipped with approved LRNS.</td><td colspan="2"> 
</td></tr>
</table>

Minima	Application	Conditions	Diagram
T7a **Definite Passing (radio fix)**		Both aircraft report passing the same positive radio fix.	
T7b **Definite Passing (visual fix)**		1. Both aircraft report passing the same visual fix, by day, or by night if both aircraft are NIGHT VFR. 2. The visual fix must be a prominent topographical feature within 10 000 ft of the levels of each aircraft.	
T7c **Definite Passing (sight and pass)**		1. Both aircraft report sighting and passing the other by day (and in OCA by night). 2. Both aircraft are above 10 000 ft. 3. ATC ensures there is no possibility of incorrect identification by either aircraft.	

Minima	Application	Conditions	Diagram
T7d **Definite Passing (ATS surveillance system observed)**		Aircraft are observed by ATS surveillance system to have definitely passed.	
T8a **15 min** **Crossing Tracks**	15 min **exists** at the crossing point	1. Each aircraft must have at least 1 of the following LRNS approvals: (a) NAV/AUSEP; (b) NAV/GPSOCEANIC; (c) NAV/GPSRNAV (within Australian Domestic Airspace); (d) MNPS; (e) RNP10; (f) RNP4. 2. Relevant aircraft must have a groundspeed of at least 300 kt. 3. For T8b only: Vertical separation must exist from 15 min before the estimate for B at the intersection, until 15 min after A has passed the intersection.	
T8b **15 min** **Crossing Tracks**	15 min **does not exist** at the crossing point		**From:**  **Until:** 

10.6.5 Application of Time Departure Minima

10.6.5.1 Time departure minima are only applicable during initial climb until reaching the cruising level.

10.6.5.2 Where the planned speed differential between aircraft subject to these departure minima is at or near the minimum prescribed, climbing/cruising speeds must be specified where appropriate to ensure the integrity of the standard.

10.6.5.3 The planned CLIAS notified by GA VFR shall not be amended. The CLIAS of other VFR flights may be altered if agreed to by the pilot.

10.6.5.4 Departure (DEP) Minima 1 to 6 may be applied when:

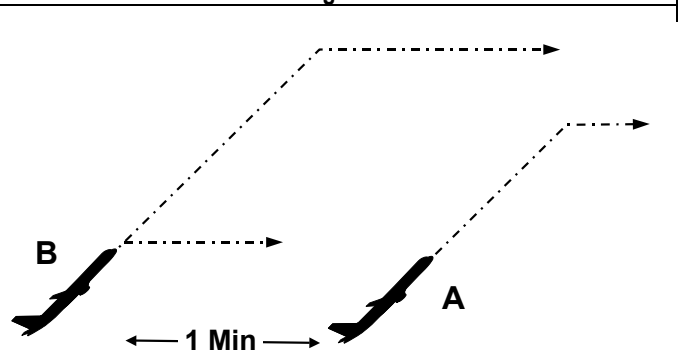
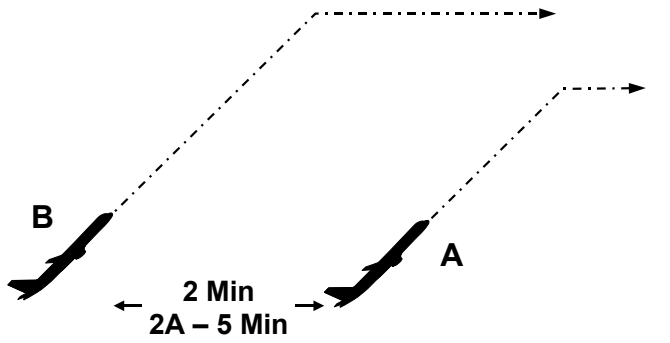
(a) both aircraft proceed on the same route where a turn of 40 degrees or less is specified; or

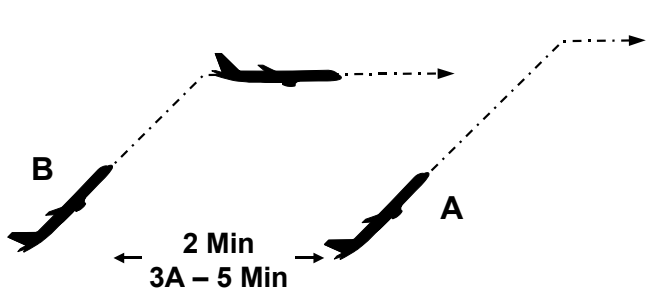
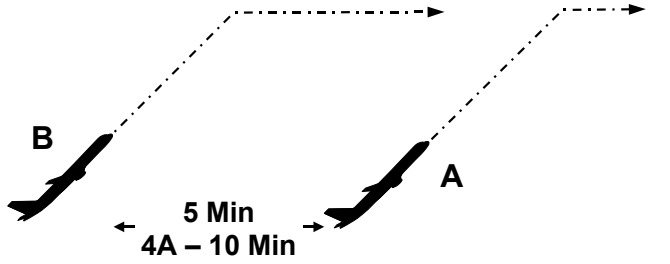
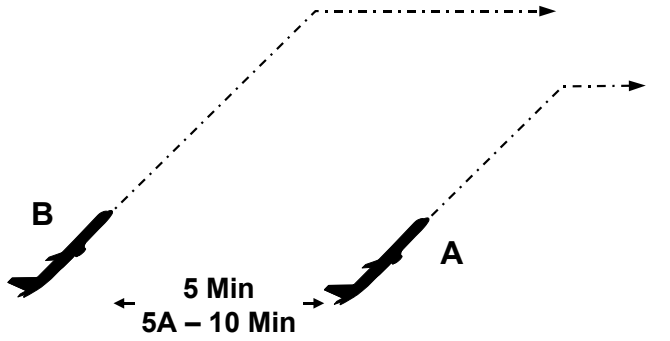
(b) the following aircraft's route involves a turn of more than 40 degrees, the preceding aircraft must continue straight ahead or turn by 30 degrees or less;

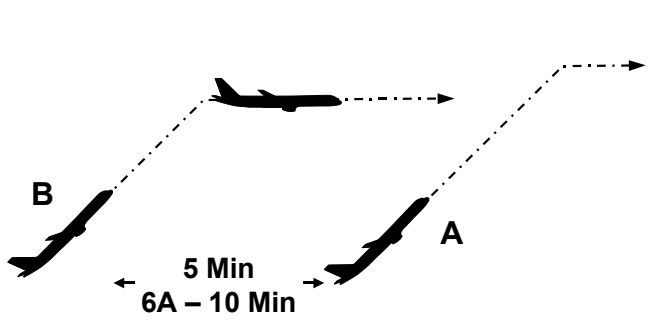
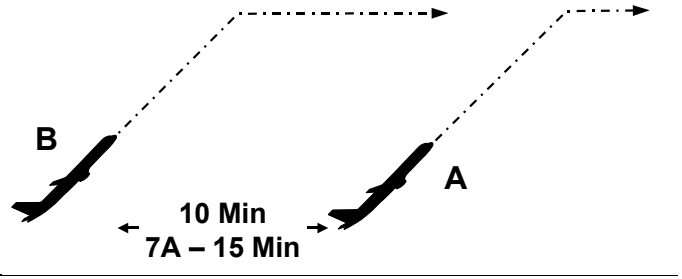
(c) when the turn in track is 31 degrees to 40 degrees, Departure standard 5 may only be used if the turning point is defined by a radio navigation aid, or radar is used to observe the turn and ensure the departure standard does not decrease until the aircraft is established on the new track.

10.6.5.5 Departure (DEP) minima 2A, 3A, 4A, 5A and 6A may be applied when both aircraft proceed on the same route on which a turn of 41 degrees to 65 degrees is specified.

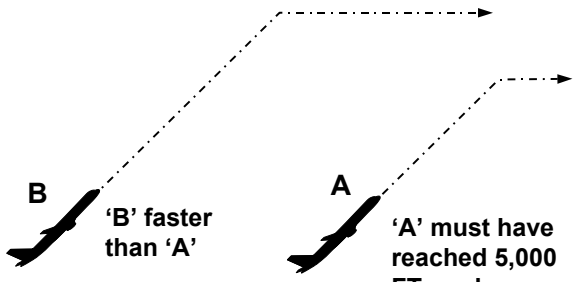
10.6.6 Time Departure Separation Minima

Minima	Application	Conditions	Diagram
Dep 1 **1 MIN**	Following aircraft climbing to a higher or lower level.	1. CLIAS of the first aircraft is at least 50 KT faster than the CLIAS of the second and at least 30 KT faster than the cruising IAS of the second; and 2. Either: a. the bearing from a point 1 NM along the runway extension to a point 5 NM along the departure track is within 30 degrees of the runway bearing; or b. the aerodrome controller can visually separate the aircraft until they have intercepted the departure track with the required separation.	
Dep 2/2A **2/5 MIN**	Following aircraft climbing to the higher level	CLIAS of the second aircraft is at least 10 KT slower and not more than 90% of the CLIAS or Mach No. of the first aircraft.	

Minima	Application	Conditions	Diagram
Dep 3/3A **2/5 MIN**	Following aircraft climbing to the lower level.	1. Both aircraft report reaching the lower cruising level; 2. If the following aircraft reaches the cruising level first, another form of separation must be applied immediately; 3. CLIAS of the second aircraft is at least 10 KT slower, and not more than 90% of the CLIAS or Mach No. of the first aircraft; and 4. Cruising IAS of the second aircraft is less than or equal to the CLIAS or Mach No. of the first aircraft.	
Dep 4/4A **5/10 MIN**	Following aircraft climbing to the same level.	1. Both aircraft report reaching the cruising level; 2. If the second reaches that level first, another form of separation must be applied; and 3. CLIAS and cruising IAS of the second aircraft is at least 10 KT slower, and not more than 90% of the CLIAS and cruising IAS or Mach No. of the first aircraft.	
Dep 5/5A **5/10 MIN**	Following aircraft climbing to a higher level.	1. CLIAS of the second aircraft is less than or equal to the CLIAS of the first aircraft; and 2. If the turn in track is between 31 and 40 degrees, the turning point must be defined as a radio navigation aid, or radar must be used to observe the turn and ensure the departure standard does not decrease until the aircraft is established on the new track.	

Minima	Application	Conditions	Diagram
Dep 6/6A **5/10 MIN**	Following aircraft climbing to a lower level.	1. Both aircraft report reaching the lower cruising level; 2. If the second aircraft reaches cruising level first, another form of separation must be applied immediately; 3. CLIAS of the second aircraft is less than or equal to the CLIAS of the first aircraft; and 4. If the turn in track is between 31 and 40 degrees, the turning point must be defined as a radio navigation aid, or radar must be used to observe the turn and ensure the departure standard does not decrease until the aircraft is established on the new track.	
Dep 7/7A **10/15 MIN**	Following aircraft climbing to the same level.	1. Both aircraft report reaching the cruising level; 2. If the second reaches that level first, another form of separation must be applied; and 3. CLIAS of the second aircraft is less than or equal to the CLIAS of the first aircraft.	

<table>
<tr><th>Minima</th><th>Application</th><th>Conditions</th><th>Diagram</th></tr>
<tr>
<td>Dep 8
Distance Determined by Speed</td>
<td>Faster following aircraft climbing to higher level.</td>
<td>1. Only useable when the first aircraft has reached 5,000 FT or above;
2. The vertical difference between the aircraft must be used to determine the appropriate distance required between the aircraft. This distance must be subtracted from the DME distance of the leading aircraft (see table);
3. The following aircraft must be instructed to reach 1,000 FT above the leading aircraft's cruising or maintain level, by the DME distance determined at 2;
4. Where both aircraft are airborne, the DME distance and levels of both aircraft must be required. Otherwise, only that of the leading aircraft is required; and
5. When the procedure is applied to a following aircraft that has not departed, the requirement must be updated once that aircraft has departed.

Note: Separation of not less than 15 NM is provided when the following aircraft reaches 1,000 FT above the level the leading aircraft has maintained.</td>
<td>


<table>
<tr><td>Vertical Distance Between Aircraft</td><td>5,000–7,000 FT</td><td>7,001–10,000 FT</td><td>10,001–20,000 FT</td><td>More than 20,000 FT</td></tr>
<tr><td>Miles to be Subtracted</td><td>15</td><td>10</td><td>5</td><td>0</td></tr>
</table>
</td>
</tr>
</table>

Minima	Application	Conditions	Diagram
Dep 8 **Distance Determined by Speed (cont)**		Examples 1. An F50 climbing to FL160 reports 50DME; an A320 ready for departure is required to reach FL 170 by 45 DME. After departing, the A320 reports 7,000 FT at 9 DME and the F50 65 DME, cruising FL160; the A320 may be given an updated requirement to reach FL170 by 55 DME. 2. A DHC8 reports cruising 9,000 FT at 30 DME. A B737 just departed is required to reach 10,000 FT on climb to FL250 by 20 DME. 3. An F50 climbing to FL180 reports 45 DME and is maintained at FL130. A B737 after departing and climbing through 4,000 FT is required to reach FL140 by 35 DME. 4. A C130 climbing to FL230 reports at 45 TACAN leaving 10,000 FT. An F18 ready for departure is instructed to reach FL240 by 35 TACAN.	

10.6.7 Application of Longitudinal Distance Separation

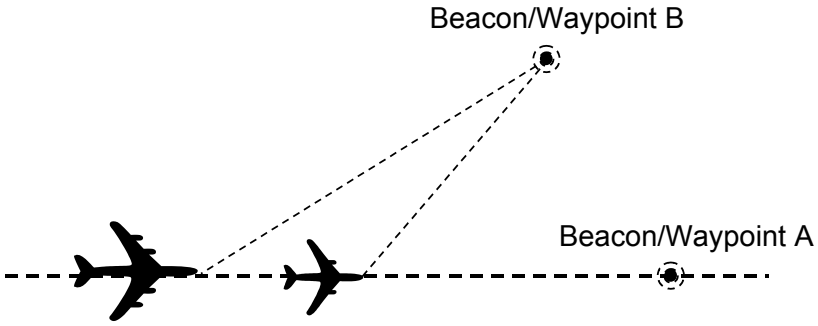
10.6.7.1 Distance based longitudinal separation minima must only be applied when:

(a) Direct Controller Pilot Communications (DCPC) exist; or

(b) ATC monitors all distance reports made by the aircraft.

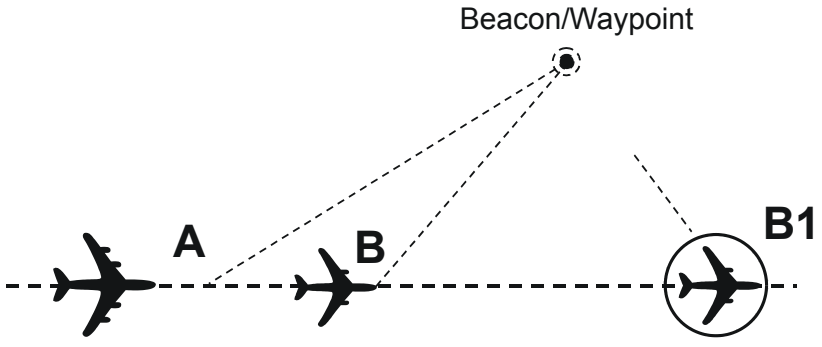
> **Note:** The requirement for DCPC is met by the use of Controller Pilot Datalink Communications (CPDLC).

10.6.7.2 All distance reports must be made with reference to the same DME beacon or waypoint.



Beacon/Waypoint A or B can be used provided both aircraft use the same beacon/waypoint

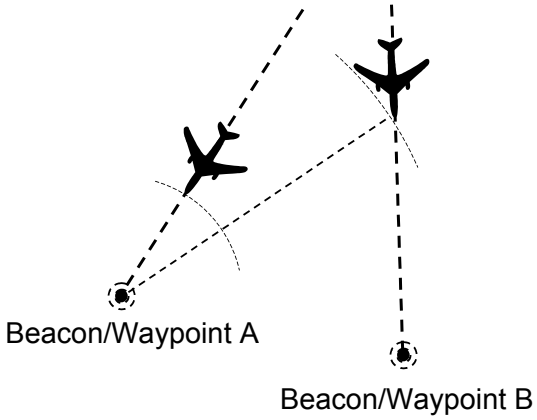
10.6.7.3 When applying same direction distance separation, an off-track waypoint or beacon may be used provided the positions of the aircraft relative to the beacon/waypoint are such that the distance readings are together increasing or decreasing.



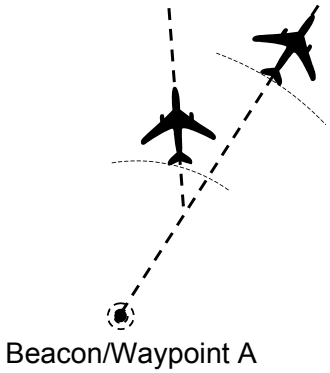
Distance minima cannot be applied if aircraft B1 is in this position relative to A

10.6.7.4 A DME beacon may be taken to be co-sited with a waypoint or the azimuth navigation aid providing tracking guidance only when the DME site is located within 600 m of the waypoint or azimuth aid.

10.6.7.5 Where aircraft have been issued with different route clearances, and the difference in routes would apply during the period when distance separation is required, the leading aircraft must be tracking directly to or from the beacon/waypoint or co-sited navaid.



Beacon/Waypoint A in use with the leading aircraft tracking directly to that beacon/waypoint



Leading aircraft tracking directly from the beacon/waypoint

10.6.7.6 If a mix of DME and LRNS distances is being used:

(a) LRNS distance information must be based on the coordinates of the en route tracking aid, and not on the location of the DME site; and

(b) LRNS derived distance may be used for longitudinal separation only when the en route tracking aid and DME are co-sited.

10.6.7.7 Where distance information is required from a specific navigation source, the source must be included in the request (e.g. “REPORT DISTANCE FROM NWN DME”, “REPORT GPS DISTANCE FROM BEZZA” or “REPORT RNAV DISTANCE FROM PONAN”).

10.6.7.8 During the application of same direction distance minima, the distance between aircraft must be checked at sufficient intervals to ensure that the required separation is maintained. The frequency of these regular distance checks will depend on the performance and disposition of the aircraft, but must be made at intervals not exceeding 30 MIN.

10.6.7.9 When the ATS surveillance system derived distance between the aircraft is less than the sum of the distance required by the procedural separation minimum and the applicable ATS surveillance system separation minimum, a distance check must be made before the first aircraft leaves ATS surveillance system coverage.

10.6.7.10 Separation minima D4, D7 and R3 (change of level) may also be applied between 2 aircraft if:

(a) the aircraft are confirmed to be on opposite sides of an en-route navigation aid, and 1 aircraft’s distance is established by RNAV/DME to be not closer to that aid than the distance required by the separation minimum; or

(b) the distance determined by an ATS surveillance system, or by the position of 1 identified aircraft and an RNAV/DME report from the other, establishes that the distance between the aircraft is at least the distance required by the procedural separation minimum plus the applicable ATS surveillance system separation minimum; or

(c) 1 aircraft’s distance is established by RNAV/DME and the second aircraft’s position is established, by day, with reference to a visual fix, if:

(i) the fix is a prominent topographical feature within 10 000 ft of the aircraft; and

(ii) the feature is displayed on maps available to ATC.

10.6.7.11 Except for standard R6, closing speed between aircraft may exist provided that:

(a) separation is in excess of the minimum distance required;

(b) distance checks are made at intervals not exceeding 15 MIN; and

(c) when aircraft are cruising at levels not vertically separated, the closing speed is not greater than 35 KT IAS or M 0.06.

10.6.8 Use of DME/GPS Separation

10.6.8.1 In the description and application of these separation minima, 'DME' includes TACAN for distance measurement. TACAN distances may be used for the same purpose as DME provided that all tolerances and conditions shown for DME are applied.

10.6.8.2 In CTA only, GPS distance information may be provided by GPSRNAV or GPSOCEANIC aircraft for the application of minima D1-4, subject to the following conditions:

(a) where a mix of GPS and DME distances is used, distance reports must not be used if one aircraft is within 20 NM of the reference point;

(b) when GPS is used by both aircraft, the standard may also be applied with reference to published waypoints.

10.6.9 RNAV Separation

10.6.9.1 RNAV distance minima may be applied between aircraft with approved LRNS, or between an aircraft with approved LRNS equipment and an aircraft with DME.

10.6.9.2 RNAV minima must not be applied after pilot advice of:

(a) operation of LRNS equipment outside prescribed criteria, including deterioration or failure; or

(b) operation of an INS/IRS outside the time limits mentioned in the operational approval:

(i) CTA — 5 hours multiple sensor or 3 hours single sensor; or

(ii) OCA — 12 hours multiple sensor, 5 hours single sensor or 4.5 hours MNPS; or

(c) RAIM loss or loss of integrity, for more than 5 minutes; or

(d) operation of the GPS receiver in dead reckoning mode, for more than 1 minute; or

(e) loss of the GPS receiver navigation function, for more than 1 minute.

10.6.9.3 If there is concern that the update criteria mentioned in paragraphs 10.6.9.2 (a) and (b) may not be met throughout the application of an RNAV standard, the time of the last update must be obtained from the pilot.

10.6.9.4 Separation based on RNP approval may only apply in RNP airspace.

10.6.10 Longitudinal Distance Separation Using ADS-C

10.6.10.1 When using ADS-C reports from FANS-1/A aircraft as the sole means of establishing and monitoring longitudinal distance separation standards, only those standards specifically identified as being approved for ADS-C may be used.

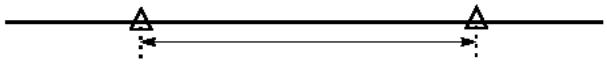
10.6.10.2 Longitudinal distance separation using ADS-C may be established by measuring the distance between:

(a) the displayed positions of 2 or more FANS-1/A aircraft reporting by ADS-C; or

(b) an ADS-C report symbol of a FANS-1/A aircraft and the position of another aircraft determined by an alternative form of position fixing, such as radar, ADS-B, voice or CPDLC reports.

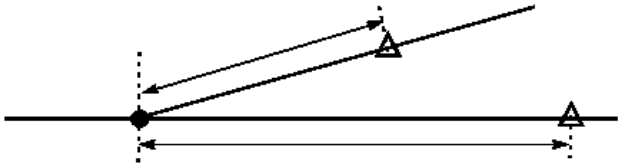
10.6.10.3 All system tool tolerances must be taken into account in any measurement.

10.6.10.4 When 2 FANS-1/A aircraft reporting by ADS-C are flying on the same identical tracks (same or opposite direction), the measurements may be taken directly between the 2 ADS-C symbols.

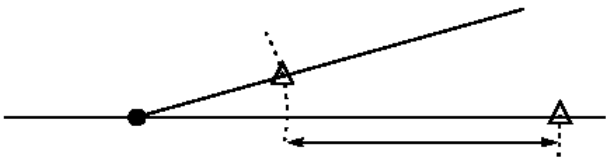


10.6.10.5 For a bend in track, the measurements may only be taken between each symbol and the turning point, not between the 2 symbols:

10.6.10.6 If 2 FANS-1/A aircraft are flying on diverging or converging route clearances, then measurements may be either to or from a common point on the route clearances:



or taken from where the abeam position of 1 aircraft intersects the route of the other.



10.6.10.7 When longitudinal distance separation is to be determined between FANS-1/A and non-FANS-1/A aircraft:

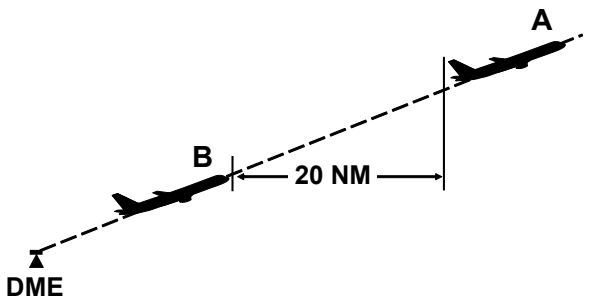
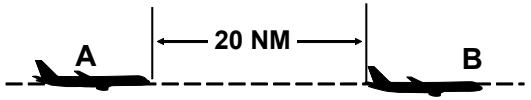
(a) the measurement may only be commenced after receiving an ADS-C report from the FANS-1/A aircraft; and

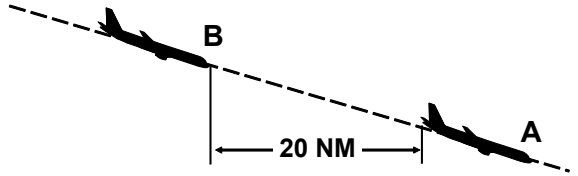
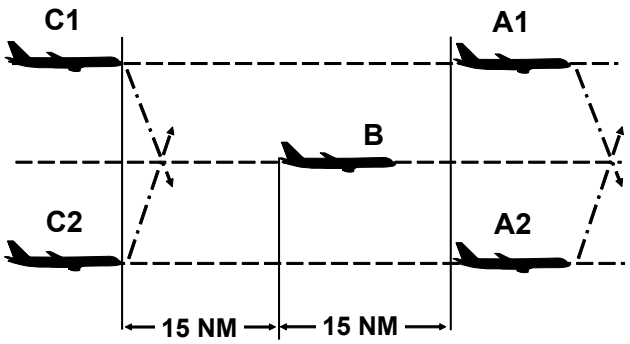
(b) the request for the voice report must be made as soon as possible after the ADS-C report symbol is displayed; and

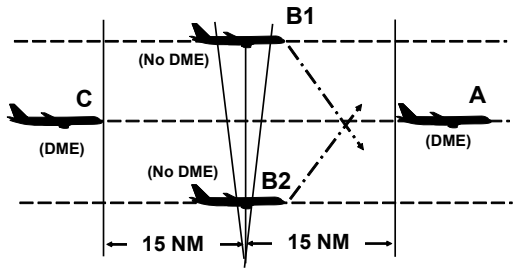
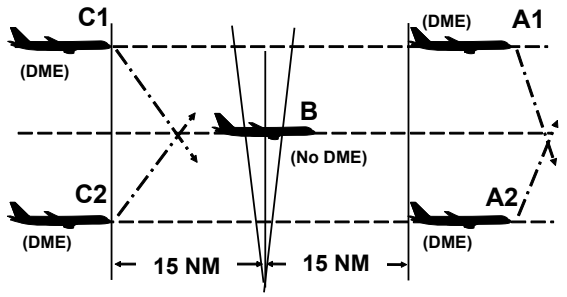
(c) this procedure may only be used when a distance greater than the minimum of the applicable standard is available.

10.6.10.8 When comparing an ADS-C report symbol from a FANS-1/A aircraft with a voice report from another aircraft, the measurement from or to the ADS-C symbol must be taken with reference to the beacon or waypoint reported by the other aircraft.

10.6.11 Distance Separation Minima

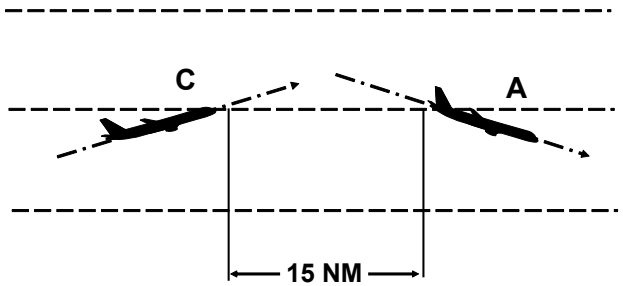
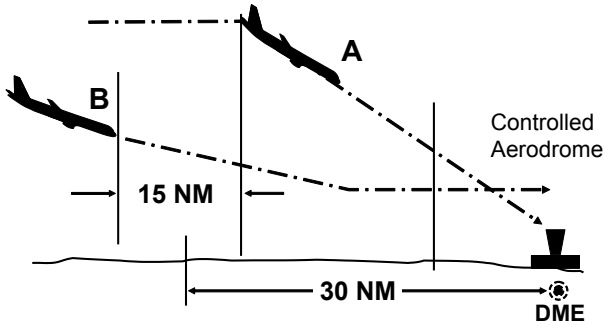
Minima	Application	Conditions	Diagram
D1 **20 NM**	Climbing (for aircraft on climb to cruise)	1. Separation must be checked at sufficient intervals to ensure minimum separation is maintained. 2. Where B is climbing to a lower cruising level or both aircraft are climbing to levels which are not vertically separated, both A and B must report reaching their cruising levels. 3. If aircraft B reports at cruising level first, immediate action must be taken to apply an alternative standard. 4. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	
D2 **20 NM**	Cruising (at levels not vertically separated)	1. Separation must be checked at sufficient intervals to ensure that minimum separation is maintained. 2. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	

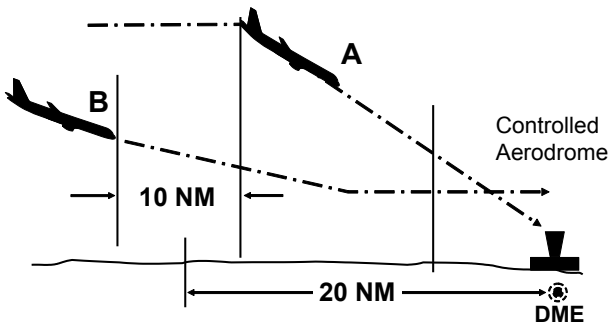
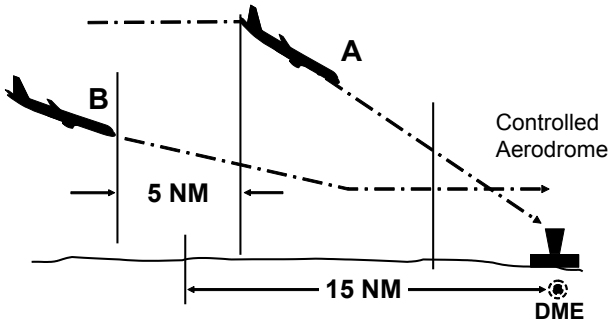
Minima	Application	Conditions	Diagram
D3 **20 NM**	Arriving aircraft	1. Separation must be checked at sufficient intervals to ensure minimum separation is maintained. 2. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	
D4A **15 NM**	Change of level	1. One aircraft must maintain level flight while vertical separation does not exist. 2. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC. 3. When using DME-derived information for level changes above FL 290, both aircraft must be on the same side of the DME beacon.	

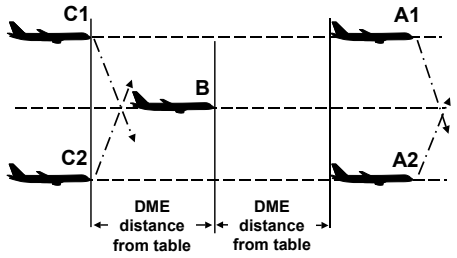
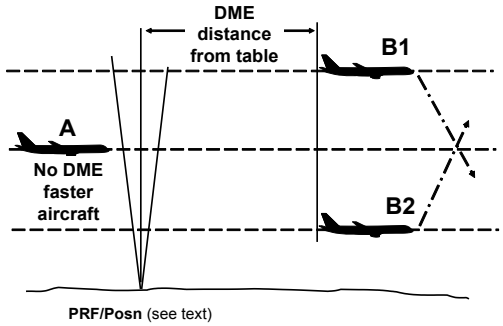
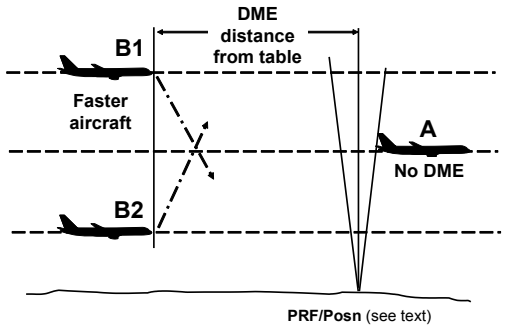
Minima	Application	Conditions	Diagram
D4b **15 NM**	Change of level (1 aircraft equipped with DME and non-DME aircraft climbing/ descending) Also applicable if B is on the safe side of the aid at the commencement of level change	1. Non-DME B1 or B2 descending/climbing while A or C maintain level. 2. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	 **PRF/Posn** (see text)
D4c **15 NM**	Change of level (non-DME aircraft maintains level while DME equipped aircraft climbing/ descending) Also applicable if B is on the safe side of the aid at the commence-ment of level change	1. A1, A2 or C1, C2 climbing or descending while non-DME B maintains level. 2. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	 **PRF/Posn** (see text)

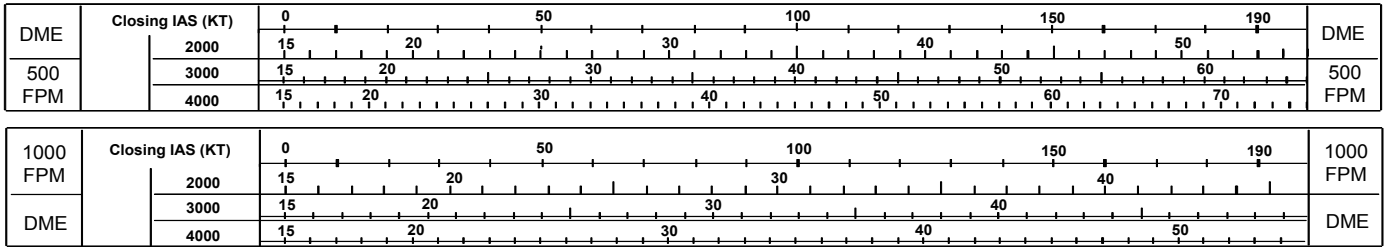
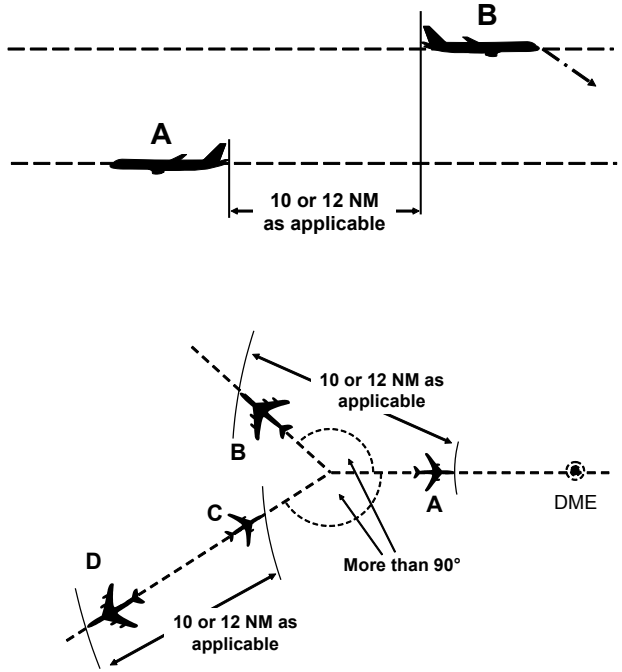
Note 1 In 4a, 4b and 4c, if the distance obtained is close to the minimum, then consideration must be given to a descending aircraft being faster than the cruising aircraft, or a climbing aircraft being slower than the cruising aircraft. ATC may impose speed restrictions or requirements to ensure the required separation is maintained.

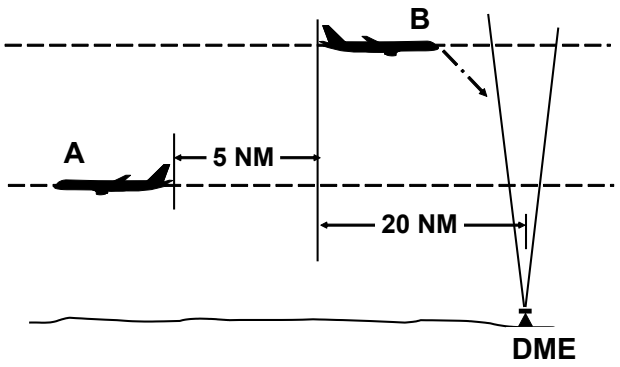
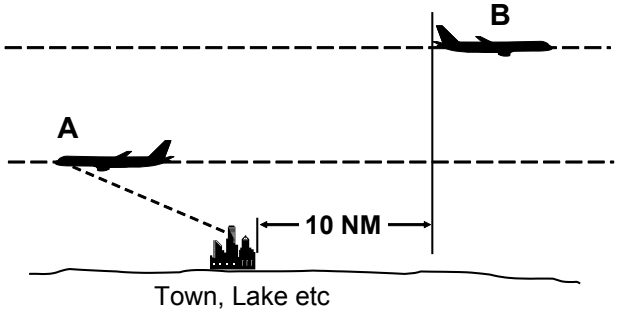
Note 2 In 4b and 4c, if the position of 1 aircraft is determined by radar or ADS-B, the applicable ATS surveillance system minimum must be added.

Minima	Application	Conditions	Diagram
D4d **15 NM**	Leading aircraft descending through level of following climbing aircraft	1. The leading aircraft A is descending through the level of C (climbing). 2. DME distances must be checked in sufficient time to ensure vertical separation is maintained if insufficient distance exists to apply this standard. 3. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC. 4. When using DME-derived information for level changes above FL 290, both aircraft must be on the same side of the DME beacon.	
D4e **15 NM** **Arriving Aircraft**	Inbound aircraft to a controlled aerodrome	1. Both A and B are inbound aircraft and the leading aircraft A is within 30 NM of a controlled aerodrome with DME. 2. The aircraft are assigned levels which are vertically separated. 3. Distance information must be derived from: (a) DME; or (b) in CTA only: (i) GPSRNAV; or (ii) GPSOCEANIC.	

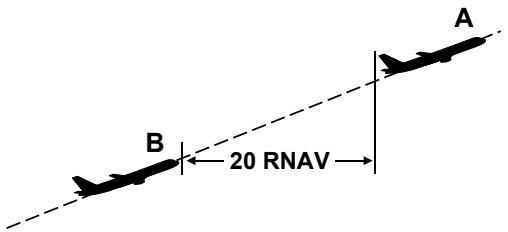
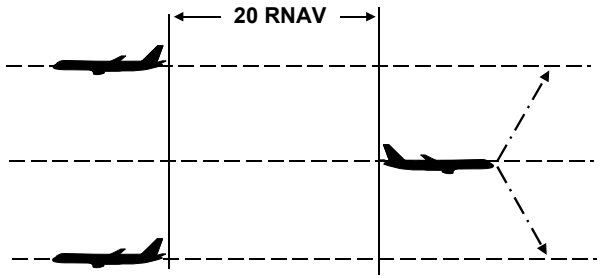
Minima	Application	Conditions	Diagram
D5 **10 NM** **Arriving Aircraft**	Change of level	1. Both A and B are inbound aircraft and the leading aircraft A is within 20 NM of a controlled aerodrome with DME. 2. The aircraft are assigned levels which are vertically separated. 3. Both aircraft are DME equipped.	
D6 **5 NM** **Arriving Aircraft**	Change of level	1. Both A and B are inbound aircraft and the leading aircraft A is within 15 NM of a controlled aerodrome with DME. 2. The aircraft are assigned levels which are vertically separated. 3. Both aircraft are DME equipped. 4. Wake turbulence standards are applied.	

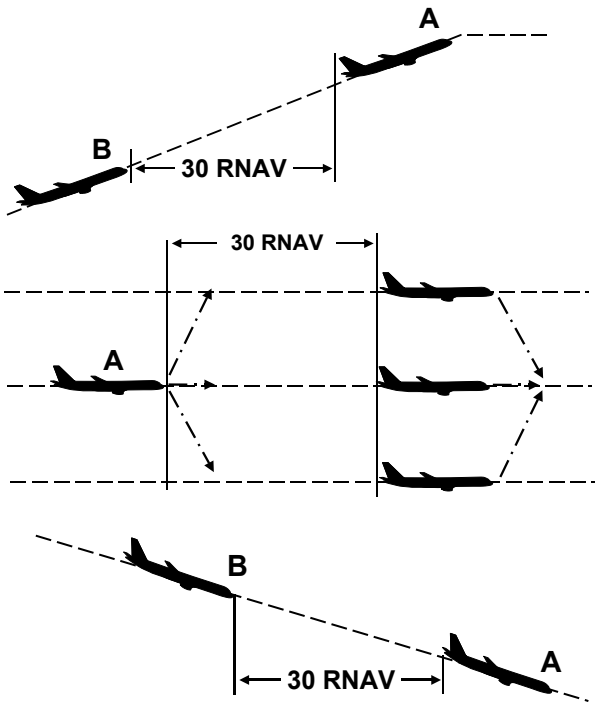
Minima	Application	Conditions	Diagram
D7 **A DME distance proportional to the rate of closure (IAS) as determined from the following DME separation tables for aircraft rate and amount of level change**	Change of level Also applicable if a non-DME equipped aircraft is on the safe side of the aid at the commencement of level change	1. One aircraft maintains level while vertical separation does not exist. 2. DME distances are checked when the aircraft are vertically separated by the minimum amount appropriate to the DME table to be used. 3. The level change is commenced within 1 min of obtaining DME distances. When the separation is on the minimum, instructions must be issued to ensure that the level change is commenced within this time. 4. Where the position of 1 aircraft is determined by an ATS surveillance system, the applicable ATS surveillance system minimum must be added. 5. When using DME-derived information for level changes above FL 290, both aircraft must be on the same side of the DME beacon. 6. When applying this separation minimum to an aircraft transiting the transition level and the Area QNH is higher than 1013 hPa, 1 000 ft must be added to the amount of level change and the applicable value in the table must then be utilised (e.g. for a 3 000 ft level change, use 4 000 ft table).	  

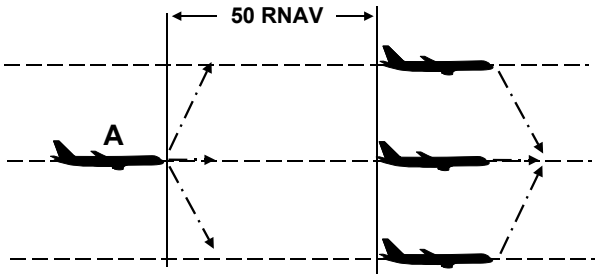
Minima	Application	Conditions	Diagram
			
D8a **Definite Passing** **10 NM** **(12 NM at distances greater than 180 NM)**	Reciprocal tracks and tracks differing by more than 90 degrees	Reports indicate that the aircraft have passed and DME distance is opening.	

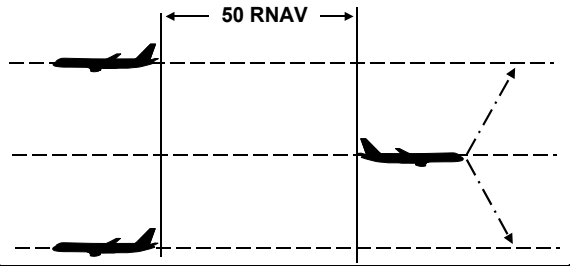
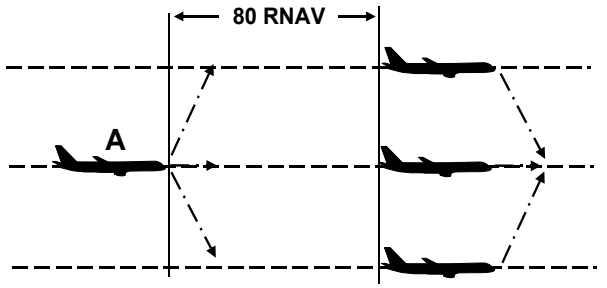
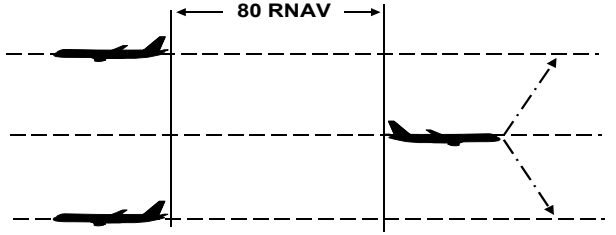
Minima	Application	Conditions	Diagram
D8b **Definite Passing** **5 NM**	Reciprocal tracks	1. Reports indicate that the aircraft have passed and DME distance is opening. 2. One aircraft is within 20 NM of the DME beacon.	
D8c **Definite Passing** **10 NM**	Reciprocal tracks	1. Reports by reference to a prominent topographical feature by 1 aircraft and a DME beacon by the other aircraft indicate that the aircraft have passed by at least 10 NM. 2. The non-DME equipped aircraft passes over and within 10 000 ft of the topographical feature. 3. The topographical feature together with its distance from the DME beacon is specified in local Instructions.	

10.6.12 RNAV Distance Separation Minima

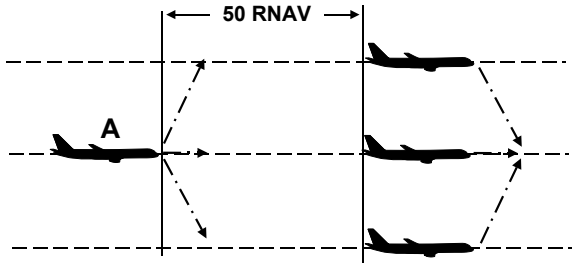
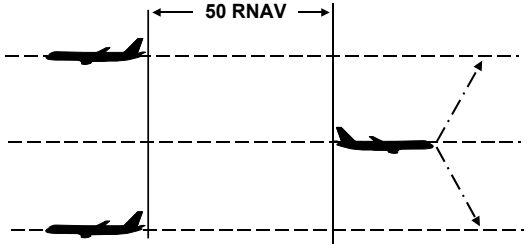
Minima	Application	Conditions	Diagram
R1 **20 RNAV**	Departing aircraft on climb to vertically separated cruising levels	1. Where B is climbing to the lower level, both A and B must report reaching their cruising levels. 2. If B reports at the cruising level first, immediate action must be taken to apply an alternative standard. 3. May only be used in CTA. 4. Aircraft must be approved: (a) AUSEP; or (b) GPSRNAV; or (c) GPSOCEANIC; or (d) RNP10; or (e) RNP4.	
R2 **20 RNAV**	Definite Passing	1. Using the same waypoint, reports indicate that the aircraft have passed and the distance between them must be opening. 2. Whenever a DME derived distance is 30 NM or less, a correction for DME Slant Range Error must be applied. 3. May only be used in CTA. 4. Aircraft must be approved: (a) AUSEP; or (b) GPSRNAV; or (c) GPSOCEANIC; or (d) RNP10; or (e) RNP4.	

Minima	Application	Conditions	Diagram
R3 **30 RNAV**	Climbing, cruising or descending	1. When both aircraft are climbing to non-vertically separated levels: (a) both A and B must report reaching their cruising levels; and (b) if B reports at the cruising level first, immediate action must be taken to ensure separation is maintained. 2. May only be used in CTA. 3. Aircraft must be approved: (a) AUSEP; or (b) GPSRNAV; or (c) GPSOCEANIC; or (d) RNP10; or (e) RNP4. 4. When using DME-derived information for level changes above FL 290, both aircraft must be on the same side of the DME beacon.	

Minima	Application	Conditions	Diagram
R4 **50 RNAV**	Aircraft cruising, climbing or descending on same track	1. Separation must be established by reference to the same 'on-track' waypoint, whenever possible ahead of both aircraft or by use of ADS-C. 2. Distance reports obtained by CPDLC must be sent by both aircraft at the same time or from the leading aircraft first. 3. When aircraft are at, or expected to reduce to, the minimum, speed control techniques, including assigning Mach number, must be applied to ensure that the minimum distance exists throughout the period of application of the standard. 4. If an aircraft fails to report its position within 3 min, immediate action must be taken to establish communication. If communication is not established within 8 min from the time the report should have been received, an alternative form of separation must be applied. 5. Both aircraft must be approved either RNP10 or RNP4. 6. Subject to subsection 10.6.7.11, distance reports must be obtained at least every 24 min.	

Minima	Application	Conditions	Diagram
R5 **50 RNAV**	Definite Passing	1. Reports (including ADS-C reports) must indicate that the aircraft have passed and the distance between them is opening. 2. Both aircraft must be approved either RNP10 or RNP4.	
R6 **80 RNAV** **Mach No. Technique**	Aircraft cruising, arriving and changing levels when not vertically separated	1. No closing Mach number may exist. 2. The Mach Number Technique (MNT) must be applied during the application of the standard. 3. Aircraft must be approved: (a) AUSEP; or (b) GPSOCEANIC; or (c) MNPS. **Note:** The requirement for 'no closing' may not be waived.	
R7 **80 RNAV** **Definite Passing**		1. Using the same waypoint, reports must indicate that the aircraft have passed and the distance between them is opening. 2. Aircraft must be approved: (a) AUSEP; or (b) GPSOCEANIC; or (c) MNPS.	

10.6.13 Distance Separation minima using RNAV with Automatic Dependent Surveillance – Contact

Minima	Application	Conditions	Diagram
A1 **50 RNAV using ADS-C**	Aircraft cruising, climbing or descending on same track	1. Separation must be established in accordance with subsection 10.6.10. 2. When aircraft are at, or expected to reduce to, the minimum, speed control techniques, including assigning Mach number, must be applied to ensure that the minimum distance exists throughout the period of application of the standard. 3. If an ADS-C periodic report is not received within 3 min of the time it should have been sent, action must be taken to establish communication. If communication is not established, or a periodic report is not received within 8 min from the time the periodic report should have been received, an alternative form of separation must be applied. 4. Both aircraft must be approved either RNP 10 or RNP 4. 5. Subject to subsection 10.6.7.11, distance or periodic ADS-C reports must be obtained at least every 24 min.	
A2 **50 RNAV using ADS-C**	Definite passing	1. ADS-C reports must indicate that the aircraft have passed and the distance between them is opening. 2. Both aircraft must be approved either RNP 10 or RNP 4. 3. Before the application of this standard, a Demand Contract Request (One shot) must be transmitted to each aircraft concerned.	

Section 10.7: Separation Standards—Vertical

10.7.1 Vertical Buffers between Aircraft Inside and Outside Controlled Airspace

10.7.1.1 Levels assigned to VFR aircraft must provide a buffer of at least 500 FT with the base of CTA.

10.7.1.2 If the base of CTA is a VFR level, levels assigned to IFR aircraft must provide a buffer of at least 500 ft with the base of CTA. If it is known that an IFR aircraft is operating less than 500 ft below the CTA base, levels assigned must provide a buffer of at least 1 000 ft with the base of CTA.

10.7.1.3 Where the base of CTA is an IFR level, levels assigned to IFR aircraft must provide a buffer of at least 1,000 FT with the base of CTA, unless it is known that no IFR traffic is operating at the base of CTA. In this instance a buffer of at least 500 FT must be applied.

10.7.2 Vertical Separation Below High Altitude Balloons

10.7.2.1 Unless visual separation is applied, aircraft in CTR/CTA must not be permitted to transit vertically below the 15 NM radius of the balloons position while the balloon is ascending until the balloon has passed FL600.

10.7.3 Step Climbs and Descents

10.7.3.1 The Step Climb Procedure may be used to simultaneously climb aircraft to vertically separated levels provided that the lower aircraft is progressively assigned levels that provide vertical separation with the higher aircraft.

10.7.3.2 When applying the step climb or step descent procedures, pilots must be advised that they are subject to a step climb or descent.

10.7.4 Specifying Rates of Climb

10.7.4.1 Except for international aircraft, a rate of climb or descent must be described in each level clearance when a specified rate is required to ensure the vertical separation is maintained.

10.7.4.2 When it is necessary to specify a rate of climb or descent to an international aircraft, the rate must always be specified in feet per minute, not ‘standard rate’.

10.7.4.3 ATC must endeavour to avoid prescribing rate of climb or descent if it is believed that an aircraft is:

(a) operating in close vertical proximity to the control area lower limit; or

(b) descending VISUAL or VFR to an assigned level and maintaining clearance from terrain or cloud.

10.7.4.4 A rate of descent must not be specified to any aircraft instructed to make a ‘VISUAL APPROACH” or “DME ARRIVAL”, or to an aircraft on that part of an instrument approach below the lowest holding altitude.

10.7.5 Rate in Step Climb/Descent

10.7.5.1 During a Step Climb or Step Descent where a rate of climb or descent has been specified, the rate must apply to all level clearances issued in the course of the climb or descent. The rate must be specified in the initial clearance using the phrase: "... STEP CLIMB (or STEP DESCENT) - STANDARD RATE (or at FEET PER MINUTE)".

10.7.6 Assigning Vacated Levels

10.7.6.1 A level vacated by one aircraft may be assigned immediately to a second aircraft provided that:

(a) the required vertical separation has not been increased because of the possibility of turbulence;

(b) the first aircraft has been assigned a level requiring a level change of at least the minimum being applied; and

(c) both aircraft have been instructed to change level at a specified rate which will ensure that the applicable vertical separation standard is not infringed.

10.7.6.2 The lowest holding altitude may be assigned to a second aircraft when the first aircraft has reported, "ON FINAL - LEFT (final approach altitude)", provided that the following aircraft is instructed to descend at "STANDARD RATE" (or at 500 FT per minute).

10.7.7 Vertical Separation Using ADS-C

10.7.7.1 A tolerance of ± 200 ft must be applied to ADS-C level information.

10.7.7.2 ADS-C level information may be used for the application of vertical separation if:

(a) the reported ADS-C level is FL 130 or above; and

(b) displayed ADS-C level information is within the specified tolerance of the expected or cleared flight level.

10.7.7.3 An aircraft cleared to leave a level is taken to have commenced its manoeuvre and vacated the previously occupied level when the ADS-C-derived level information indicates a change of 400 ft or more in the anticipated direction from its previously assigned level.

10.7.7.4 If displayed ADS-C level information for an aircraft maintaining a level does not conform to the required tolerance, the controller must send a demand contract request to update the level displayed.

10.7.7.5 If, following the update, the level is still beyond the required tolerances, the pilot must be advised accordingly and requested to confirm the aircraft's level. If, following confirmation of the level, the displayed ADS-C level information is still beyond the required tolerance, another method of separation or another method of determining level information must be applied.

10.7.8 Transition Layer, Altitude and Level

10.7.8.1 The system of altimetry used in Australia makes use of a Transition Layer between the Transition Altitude of 10,000 FT and the Transition Level of FL110, to separate aircraft using QNH from those using 1013 Hpa. Cruising in the transition layer must not be permitted.

10.7.9 Common Altimeter Settings

10.7.9.1 In the application of vertical separation at or below the transition altitude, aircraft using terminal QNH and aircraft using Area QNH may be considered to be using common settings.

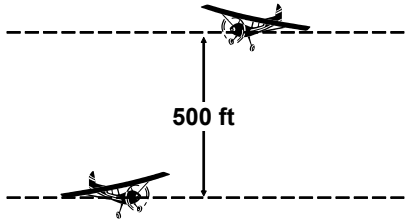
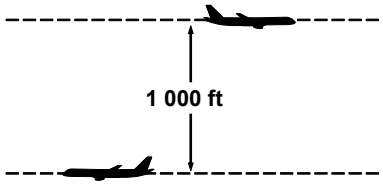
10.7.10 Levels Unavailable when QNH less than 1013

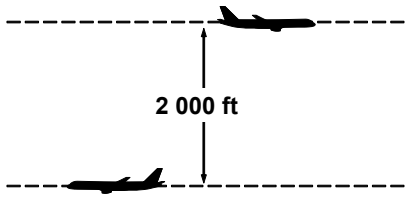
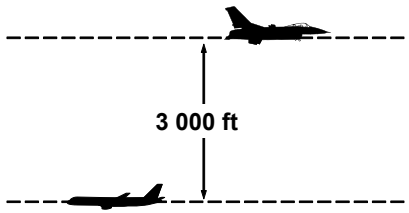
10.7.10.1 Whenever the QNH/Area QNH is less than 1013 HPa, certain flight levels at or above the transition level are precluded from use in accordance with Table 10.7-1:

Table 10.7-1

QNH less than	Level not available
1013 HPa	FL110
997 HPa	FL115
980 HPa	FL120

10.7.11 Vertical Separation Minima

Minima	Application	Conditions	Diagram
V1 **500 ft**	1. Between IFR and VFR flights; or 2. between SVFR flights, where SVFR clearance is due to visibility	1. Both aircraft are 7 000 kg MTOW or less. 2. Both aircraft are at or below 10 000 ft. 3. Traffic information is provided to the IFR flight, unless it is impracticable.	
V2 **1 000 ft**	All aircraft	Up to and including FL 290.	
	Aircraft with RVSM approval, excluding military formation flights	From FL 290 to FL 410 inclusive.	

Minima	Application	Conditions	Diagram
V3 **2 000 ft**	1. Between aircraft, when at least 1 is not RVSM approved, or 2. following pilot report of an inability to comply with RVSM, or 3. military formation flights regardless of the individual RVSM approval state of each aircraft within the formation	From FL 290 to FL 410 inclusive.	
	All aircraft	Above FL 410.	
	In known standing wave conditions or severe turbulence	All levels.	
V4 **3 000 ft**	When 1 or more aircraft is operating at supersonic speeds	All levels.	

Section 10.8: Separation Standards—Lateral

10.8.1 Lateral Separation Buffer

10.8.1.1 The Lateral Separation buffer is 1 NM between the possible positions of two aircraft. (ICAO PANS-ATM, Chapter 5.)

10.8.2 Application of Lateral Separation

10.8.2.1 Lateral separation may be achieved by:

(a) establishing an aircraft's position outside the BLSP; or

(b) applying an appropriate ATS surveillance system minimum; or

(c) applying a 1 NM buffer to the track or position of an aircraft which is determined relative to a prominent topographical feature, if:

(i) the aircraft is tracking visually; and

(ii) the aircraft is not more than 10 000 ft above the topographical feature; and

(iii) it is daytime.

10.8.2.2 Entry and Exit Points must be established by:

(a) application to a BLSP of slant range and DME equipment error corrections;

(b) application of RNAV tolerances;

(c) passage over a visual fix located on the opposite side of a BLSP from the area of conflict;

(d) passage over a positive radio fix located on the opposite side of a BLSP from the area of conflict;

(e) expiration of a time calculated using an estimate for a BLSP plus or minus:

(i) 5 minutes, if the estimate for the BLSP is within 30 min of an ATD, passage over a visual fix, positive radio fix, way point or ATS surveillance system position; or

(ii) half of the longitudinal time separation minimum applicable to the aircraft.

10.8.2.3 Aircraft transiting into an airspace in which larger tolerances are applied than that being exited are taken to be separated if:

(a) the smaller separation standard exists; and

(b) the aircraft are established on flight paths that will diverge by at least 15° until the larger separation standard is established; and

(c) the aircraft are RNAV approved to AUSEP, MNPS, GPSOCEANIC, RNP10 or RNP4.

10.8.2.4 A DME-based lateral separation entry/exit point must be calculated by:

(a) determining the ground distance from the DME site to the BLSP; then

(b) if the area of conflict (or part of it) is between the BLSP and the DME site, adding the slant range correction from Table 10.8-1 to the ground distance; then

(c) applying the correction for DME equipment error from Table 10.8-2 ensuring it is applied to a position outside the area of conflict.

10.8.2.5 Where the navigation tolerance is determined with reference to ground-based navigation aids, GPS distance may be used in lieu of a co-sited DME in the steps above.

10.8.2.6 Where the lateral separation point is less than 60 NM from, and between the area of conflict and the reference DME site, an extra 1NM must be subtracted from the DME-derived distance.

10.8.3 Navigation Tolerances

10.8.3.1 To determine the possible position of an aircraft, the following tolerance areas and range limitations must be applied.

10.8.3.2 When manual means are used for the calculation of lateral separation, the radio navaid tolerances specified below must be rounded up to the next higher half-degree.

10.8.3.3 The minimum tracking tolerance is ±1 NM.

10.8.3.4 The maximum tracking tolerance is ±30 NM in CTA and ± 50 NM in OCA.

10.8.3.5 Slant range corrections are as follows.

Table 10.8-1

Ground Distance	Slant Range Correction (in NM)			
	< = FL150	< = FL290	< = FL460	< = FL600
3 NM	2	3	6	8
4–5 NM	1	3	5	7
6–7 NM	1	2	4	6
8 NM	1	2	4	5
9–10 NM	1	2	3	5
11–12 NM	1	2	3	4
13–14 NM	1	1	3	4
15 NM	1	1	2	4
16–24 NM	1	1	2	3
25–30 NM	1	1	2	2
31–50 NM	1	1	1	2
>50 NM	1	1	1	1

10.8.3.6 Slant Range Error is negligible and corrections need not be applied at or below:

(a) 2,000 FT AGL at distances of 10 NM or greater from the DME site; or

(b) 4,000 FT AGL at distances of 30 NM or greater from the DME site.

> **Note:** Where required for a particular lateral separation problem, Local Instructions may specify a lateral separation point based on a precise slant range correction for the levels concerned.

10.8.3.7 DME equipment error corrections are as follows:

Table 10.8-2

DME Equipment Error		
Tolerance	**Conditions**	
± 0.25 NM plus 1.25% of the slant range.	Controllers may use figures from the table below. DME Equipment Error Correction	
	Slant Range	Correction
	300 NM or less	4 NM
	220 NM or less	3 NM
	140 NM or less	2 NM
	60 NM or less	1 NM

10.8.3.8 The following tolerances are applicable to short range navigation aids:

Table 10.8-3

Navigation Aid	Tolerance for Precise Plotting	Tolerance for Manual Plotting	Conditions
ILS Localiser Front Beam	± 2.4 °	± 2.5°	Within 25 NM except: 1. Above 2,000 FT AGL, within ±5° of course line 25 NM; 2. Below A050 30 NM; 3. A050 and above 50 NM.
VOR radials (or TACAN)	± 5.2°	± 5.5°	Range (based on height above the navaid): Below 5,000 FT 60 NM 5,000 to 9,999 FT 90 NM 10,000 to 14,999 FT 120 NM 15,000 to 19,999 FT 150 NM At or above 20,000 FT 180 NM* **Note:** For published lateral separation diagrams that are displayed for controller reference, a maximum range of 150 NM must be used. The tolerance can be applied outside the listed range when an inbound aircraft has reported established on the VOR/TACAN.
NDB/Locator	± 6.9°	± 7°	Range as per ERSA.
DME arc	± 2.5 NM	± 2.5 NM	Includes DME equipment error.

Navigation Aid	Tolerance for Precise Plotting	Tolerance for Manual Plotting	Conditions
Localiser Equivalence	± 1 NM	± 1 NM	The aircraft must be: (a) established on 1 of the following approaches to a runway: (i) Area Navigation — Global Navigation Satellite System (RNAV (GNSS)); (ii) Required Navigation Performance Approach (RNP APCH); (iii) Required Navigation Performance Authorisation Required Approach (RNP AR APCH); and (b) within 25 NM of the runway threshold; and (c) at or inside the Initial Approach Fix (IAF) for the runway; and (d) aligned with the centreline of the runway.

10.8.3.9 The following circular error of position (***CEP***) and cross track tolerances are applicable to long range navigation systems, subject to the conditions specified:

Table 10.8-4

Tolerance	Conditions
25 NM CEP	1 Aircraft flight notification must indicate RNP10 or RNP4. 2 Only useable for separation with the 25 NM CEP tolerance of another RNP10 or RNP4 aircraft. 3 1 NM buffer between tolerances is not required.
14 NM CEP	1 Not useable in airspace designated OCA. 2 Aircraft flight notification must indicate AUSEP, RNP10 or RNP4.
7 NM CEP	1 Not useable in airspace designated OCA. 2 Aircraft flight notification must indicate GPSRNAV or GPSOCEANIC.
Expanding formula	1 Not useable in airspace designated OCA. 2 Aircraft flight notification must indicate: (a) INS/IRS; and (b) AUSEP, RNP10 or RNP4. 3 CEP tolerance is a circle of radius: (a) 3 NM on departure, or 4 NM at each update; and (b) expanding at a rate of 3 NM per hour since departure or update, to a maximum of 14 NM radius.

Tolerance	Conditions
	4 Any lateral separation diagram so produced must be approved by the ATS provider. 5 Unless informed otherwise, ATC may assume update when 1 of the following occurs: (a) aircraft passage within 180 NM of 2 DME stations for a DME/DME fix where the position lines cross at an angle between 30° and 150°; (b) aircraft passage within 25 NM of a collocated VOR/DME beacon; (c) aircraft passage over a VOR beacon at or below FL200.
± 30 NM Cross track	Aircraft flight notification must indicate: (a) INS/IRS; and (b) AUSEP, RNP10 or RNP4.
±15 NM Cross track	1 Aircraft flight notification must indicate: (a) INS/IRS; and (b) AUSEP, RNP10 or RNP4. 2 The update interval (that is, the flight time since departure or a waypoint suitable for updating present position) does not exceed: (a) for aircraft equipped with single INS/IRS — 3 hours; or (b) for aircraft with 2 or more INS/IRS — 5 hours.

10.8.3.10 The following tolerances are applicable to visual tracking and position fixing:

Table 10.8-4

Conditions	Tolerance	
By day—powered aircraft	0 to 2,000 FT AGL	±1 NM
	2,001 to 5,000 FT AGL	±2 NM
	5,001 to 10,000 FT AGL	±4 NM
By day—non-powered glider aircraft	0 to 10,000 FT AGL	±5 NM
By night	0 to 2,000 FT AGL	±2 NM
	2,001 to 5,000 FT AGL	±3 NM
	5,001 to 10,000 FT AGL	±5 NM
By day and night	10,001 FT AGL to FL200	±8 NM
	FL201 to FL300	±12 NM
	FL301 to FL400	±16 NM

10.8.3.11 The following miscellaneous tolerances are applicable:

Table 10.8-5

Means of Position Fixing	Tolerance	Conditions
Navigation Training	20 NM CEP	Flight Notification specifies SAN/NAVEX or FTS/NAVEX. Allows for along track and cross-track errors.
Dead reckoning	± 12°	
	± 9°	Initial track guidance has been provided by NDB, VOR, or TACAN and there is no subsequent change in track.
Flight path monitoring	± 9°	1. Aircraft is observed on the ATS surveillance system to maintain track. 2. Tolerance applied from the edge of a circle of 5 NM centred on the last observed position. 3. When using radar, the distance from the radar site is less than 200 NM.

Section 10.9: Separation Standards—Applicable to En-route Area Navigation by Aircraft Using Inertial Navigation Systems

10.9.1 Introduction

10.9.1.1 This section is concerned with the horizontal (that is, lateral and longitudinal) separation standards to be employed by ATC in respect of aircraft equipped for en-route area navigation (RNAV) and approved for such operations.

10.9.1.2 The standards must not be applied when ATC is aware that the time since the last opportunity to update the RNAV system's present position exceeds the limit, or after pilot advice of:

(a) navigation equipment failure; or

(b) operation of the equipment outside the approved tolerances.

10.9.2 Lateral Separation

10.9.2.2 For lateral separation the across-track tolerance to be applied is to equal the CEP of the INS/IRS-derived position plus the FTE.

10.9.2.3 The CEP is determined from the following:

(a) at departure point the INS/IRS position can be assumed to be within a circle of radius 3 NM;

(b) the INS/IRS position can be assumed to be within a circle of radius 4 NM at a designated waypoint suitable for updating inertial present position;

(c) the CEP of the INS/IRS position expands at a rate corresponding to an increase in radius of 3 NM per hour (e.g. for a groundspeed of 300KT, divergence is 1 NM per 100 NM track flown).

10.9.2.4 The FTE when the autopilot is not coupled to the INS/IRS for steering guidance is ±2 NM across track.

10.9.2.5 Within the coverage of a short-range radio navigation aid (e.g. VOR, NDB, DME) defining the route, the tolerance applicable to that aid is to be used if it is less than that of the RNAV system.

10.9.3 Longitudinal Separation

10.9.3.1 The longitudinal separation minima based on time are derived by taking the following factors into account:

(a) the along-track navigational tolerances, assumed to be:

(i) the same for each aircraft;

(ii) equal to the magnitude of the radial error of position of the least accurate navigation system; and

(iii) calculated at the end of a route section, the end being defined as either:

(A) A waypoint satisfying the parameters for updating present position; or

(B) A ‘gate-in’ waypoint marked by NDB, VOR, DME or a combination thereof, for entry into the radio-navigation air route structure; or

(C) A waypoint beyond which a larger separation standard is specified;

(b) the tolerance of each aircraft’s estimated arrival time at the next reporting point (taken as ±3 MIN);

(c) an estimation tolerance of ±2 MIN to allow for errors in the ATC’s estimation of future positions of the aircraft in conflict;

(d) a control tolerance of ±2 MIN for control factors such as communications delays, clock errors and human factors;

(e) each of these tolerances is combined by the root sum square (RSS) method; and

(f) a buffer of 3 MIN added arithmetically.

10.9.3.2 The minimum time separation between two aircraft which are neither laterally nor vertically separated, therefore, equals:

$$Tsep = \left(\sqrt{2}.\sqrt{\left(\frac{d.60}{G/S}\right)^2 + 3^2 + 2^2} \right) + 3$$ MIN,

Where:

d = magnitude of the CEP (NM) and
G/S = minimum groundspeed (KT).

10.9.3.3 10 MIN separation between aircraft flying the same or reciprocal tracks may apply within controlled airspace provided that:

(a) for aircraft equipped with single INS/IRS the average groundspeed on a route section is not less than:
  (i) 240 KT in CTA/TCTA/OCA and the update interval does not exceed 3 hours; or
  (ii) 330 KT in OCA and the update interval does not exceed 5 hours; and

(b) for aircraft equipped with two or more INS/IRS, the average groundspeed on a route section is not less than 240 KT and the update interval does not exceed 5 hours.

10.9.3.4 15 MIN separation between aircraft flying the same or reciprocal tracks may apply within controlled airspace provided that:

(a) for aircraft equipped with single INS/IRS, the update interval does not exceed 5 hours; and

(b) for aircraft equipped with two or more INS/IRS, the average groundspeed on a route section is not less than 240 KT and the update interval does not exceed 12 hours.

10.9.3.5 20 MIN separation between aircraft flying the same or reciprocal tracks may apply within controlled airspace provided that:

(a) for aircraft equipped with single INS/IRS, the update interval does not exceed 5 hours; and

(b) for aircraft equipped with two or more INS/IRS, the update interval does not exceed 12 hours.

10.9.4 Distance Standards

10.9.4.1 The longitudinal separation minima based on distance are derived using the following assumptions and methods:

(a) the along-track navigational tolerance of an aircraft is taken as the same as for the time standards;

(b) when “NO CLOSING SPEED” is stipulated as a condition, minor variations of 4% of TAS of each aircraft, taken as 450 KT for the initial climb and 600 KT maximum thereafter, are allowed;

(c) when separation is to be checked at "FREQUENT INTERVALS" to ensure that the minimum will not be infringed, the maximum interval between checks is taken as 15 MIN;

(d) each of these tolerances is combined by the RSS method;

(e) except in the case of the R2 (definite passing) standard, a buffer of 10 NM is added arithmetically. The distance standard, therefore, equals:

$$\left(\sqrt{2}.\sqrt{d^2 + (d_c)^2}\right) + d_b \text{ nm}$$

where:

d = magnitude of the CEP (NM)
dc = 'closure' distance of each aircraft owing to TAS variation
= 3 NM for initial climb
= 6 NM for cruise, arrival and change of level
db = buffer
=10 NM (except in case of R2)
= 0 (R2 only).

10.9.4.2 The method of application of distance separation minima, together with relevant minima are contained in paragraphs 10.6.7 to 10.6.13.

10.9.5 Explanation of Derivation of Longitudinal Separation Standards

10.9.5.1 Tolerances used in the deviation of longitudinal separation standards are:

(a) initial climb:

(i) INS/IR ± 5 NM along track

(ii) DME ± 5 NM.

(b) cruise, arrival, change of level and definite passing:

(i) Single INS/IRS:

± 8.5 NM along track up to 1.5 hours

± 12.4 NM along track up to 3 hours

± 18.2 NM along track up to 5 hours

(ii) Dual INS/IRS:

± 12.9 NM along track up to 5 hours

± 27.7 NM along track up to 12 hours

(iii) DME:

± 6 NM.

For flight times exceeding 1.5 hours, INS/IRS tolerances are the largest.

10.9.5.2 The minimum time separation (Tsep) between two aircraft is given by:

$$Tsep = \left(\sqrt{2}.\sqrt{\left(\frac{d.60}{G/S}\right)^2 + 3^2 + 2^2} \right) + 3 \text{ MIN},$$

where:

d = magnitude of the CEP (NM)
G/S = minimum groundspeed (KT)

Alternatively, the equation can be expressed as:

$$G/S = 60d\left(\frac{\sqrt{(Tsep-3)^2 - 13}}{2}\right)^{-1} \text{ knots}$$

(a) 10 MIN separation (Tsep = 10 MIN):

(i) For single INS/IRS with 3 hourly updating (d = 12.4 NM) G/S = 219 KT.

(ii) for single INS/IRS with 5 hourly updating (d = 18.2 NM) G/S = 322 KT.

(iii) for dual INS/IRS with 5 hourly updating (d = 12.9 NM) G/S = 228 KT.

(iv) or dual INS/IRS with 12 hourly updating (d = 27.7 NM) G/S = 490 KT.

(b) 15 minute separation (Tsep = 15 min):

(i) for single INS/IRS with 3 hourly updating (d = 12.4 NM) G/S = 97 KT.

(ii) for single INS/IRS with 5 hourly updating (d = 18.2 NM) G/S = 142 KT.

(iii) for dual INS/IRS with 5 hourly updating (d = 12.9 NM) G/S = 101 KT.

(iv) for dual INS/IRS with 12 hourly updating (d = 27.7 NM) G/S = 216 KT.

(c) 20 minute separation (Tsep = 20 MIN):

(i) for single INS/IRS with 3 hourly updating (d = 12.4 NM) G/S = 65 KT.

(ii) for single INS/IRS with 5 hourly updating (d = 18.2 NM) G/S = 95 KT.

(iii) for dual INS/IRS with 5 hourly updating (d =12.9 NM)

G/S = 67 KT.

(iv) for dual INS/IRS with 12 hourly updating (d = 27.7 NM)

G/S = 145 KT.

(d) for simplicity, these minimum groundspeeds are rationalised as follows:

(i) a minimum groundspeed of 150 KT is assumed unless otherwise stated.

(ii) the situation requiring a minimum groundspeed of 490 KT is ignored.

(iii) the remaining minimum groundspeeds are rounded-up to the next multiple of 30 knot (that is, 240 and 330 KT).

10.9.5.3 The minimum distance separation (Rsep) between two aircraft is given by:

$$Rsep = \left(\sqrt{2}.\sqrt{d^2 + (d_c)^2} \right) + d_b \text{ nm}$$

where
d = magnitude of the CEP (NM)
dc = closure distance of each aircraft owing to TAS variation
= 3 NM for initial climb
= 6 NM for cruise, arrival and change of level
db = buffer
= 10 NM (except in case of R2)
= 0 NM (R2 only)

(a) aircraft on climb to cruising level (R1):

$$Rsep = \left(\sqrt{2}.\sqrt{5^2 + 3^2} \right) + 10\,\text{nm}$$

=18 NM.

Rounded up R1 = 20 NM.

(b) definite passing (R2 and R2A):

(i) For dual INS/IRS with 5 hourly updating

$$Rsep = \left(\sqrt{2}.\sqrt{12.9^2 + 6^2} \right) \text{nm}$$

= 20 NM = R2.

(ii) For dual INS/IRS with 12 hourly updating,

$$Rsep = \left(\sqrt{2}.\sqrt{27.7^2 + 6^2} \right) \text{nm}$$

= 40 NM = R2A.

(c) aircraft cruising, arriving or changing level (R3 and R3A):

(i) R3 = R2 + 10 NM (buffer) = 30 NM

10.9.5.4 R3A = R2A + 10 NM = 50 NM.

Section 10.10: Separation Standards—Visual

10.10.1 Application

10.10.1.1 Visual separation may be achieved:

(a) by the use of visual procedures; or

(b) by assigning visual separation responsibility to a pilot.

10.10.1.2 When applying visual separation, controllers consideration must be given to aircraft performance characteristics, particularly in relation to faster following aircraft. When necessary, corroborative evidence from the pilot of one aircraft on the relative position of another aircraft must be obtained.

10.10.1.3 ATC may assign to the pilot of 1 aircraft responsibility to maintain separation with another aircraft only if:

(a) the aircraft to be separated are operating at or below 10 000 ft; and

(b) the pilot has:

(i) reported the other aircraft in sight; and

(ii) accepted responsibility to follow, or maintain his or her own separation with, that aircraft;

10.10.1.4 Before altering the clearance of an aircraft with which visual separation has been assigned to another aircraft, the controller must ensure that visual separation can continue to be maintained.

10.10.1.5 Alternative instructions must be issued to provide separation if there is any doubt of the pilot's ability to keep the other aircraft in sight or maintain separation.

10.10.1.6 Positive identification must be established before visual separation is provided as follows:

(a) by day:

(i) identification by type;

(ii) identification by distinguishing markings if aircraft are of the same type;

(iii) identification by observing a change of heading or altitude of one of the relevant aircraft.

(b) by night:

(i) momentarily extinguish navigation lights;

(ii) select flashing navigation lights to steady;

(iii) extinguish hazard beacon;

(iv) momentarily switch on landing lights;

(v) change heading.

10.10.1.7 Visual Separation between an aircraft and a high altitude balloon may be applied provided that:

(a) the confirmed drift of the balloon is away from the aircraft;

(b) the balloon is ascending; and

(c) the operations are being conducted during daylight.

10.10.1.8 Relevant traffic information must be passed in sufficient time and detail to enable the pilot to identify and maintain separation from the other aircraft.

10.10.1.9 In circumstances where an aircraft has been instructed to maintain separation from, but not follow, an IFR aircraft, traffic information must be issued to the IFR aircraft, including advice that responsibility for separation has been assigned to the other aircraft.

10.10.1.10 The traffic information provided must contain as much as is necessary of the following to assist the pilot in identifying the other aircraft:

(a) type, and description if unfamiliar;

(b) level;

(c) position information either by clock reference, bearing and distance, relation to a geographical point, reported position and estimate, or position in the circuit;

(d) intentions, or direction of flight.

10.10.2 Separation Using Visual Observation

10.10.2.1 When weather conditions permit, the aerodrome controller may provide separation based on visual observations as coordinated with Approach Control provided that:

(a) the aerodrome controller is in agreement and accepts responsibility for the provision of such visual control;

(b) where required, the aircraft concerned are on the aerodrome control frequency;

(c) where required, specific airspace is released to the aerodrome controller for the purpose of providing such control.

10.10.2.2 Aerodrome controllers may also separate by the use of visual observation of aircraft position and projected flight paths.

10.10.2.3 When aircraft are operating visually as aerodrome traffic ATC must issue 1 or more of the following:

(a) clearances designed to maintain separation;

(b) sequencing instructions;

(c) relevant traffic information.

10.10.2.4 Pilots must be advised of their number in the landing sequence to assist in identification of traffic.

10.10.2.5 ATC must maintain, as far as possible, a continuous visual watch to detect and determine the position, and ensure the safety of, aircraft.

10.10.3 Separating Approaching Aircraft Beyond Tower View

10.10.3.1 Two approaching aircraft are deemed to be separated while the second approaching aircraft is on final approach beyond the view of the tower controller if, before commencing such final approach, the first approaching aircraft:

(a) has been sighted by the tower controller, there is reasonable assurance that a landing can be accomplished, and it is clear that no confliction will occur; or

(b) has reported commencing a missed approach, and is proceeding from a point and on a clearance such that separation could readily be maintained should the second approaching aircraft miss its approach.

10.10.3.2 Unless cleared at or before passing 10 NM from the aerodrome, this form of separation is not acceptable and another must be provided.

Section 10.11: Separation Standards—Miscellaneous

10.11.1 Parachute Jumping Exercise (PJE)

10.11.1.1 Separation between aircraft involved in PJE at the same drop zone is the responsibility of the pilots of the PJE aircraft. Separation between PJE aircraft and the parachutist is the sole responsibility of the pilots of the PJE aircraft.

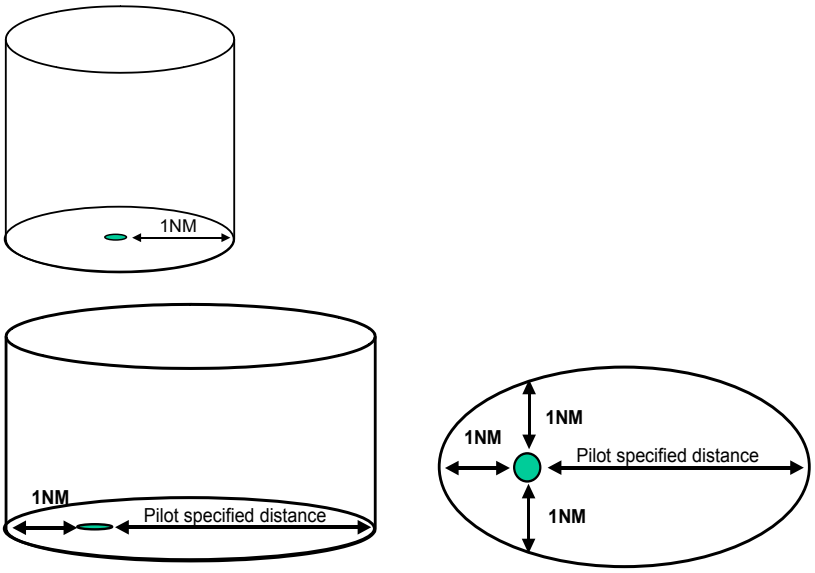
10.11.1.2 ATC must provide traffic information to PJE aircraft, and, except in Class E or G airspace, apply separation between parachutists and non-PJE aircraft.

1.1.1.4 In Class E airspace, ATC must also provide traffic information to IFR non-PJE aircraft about PJE aircraft.

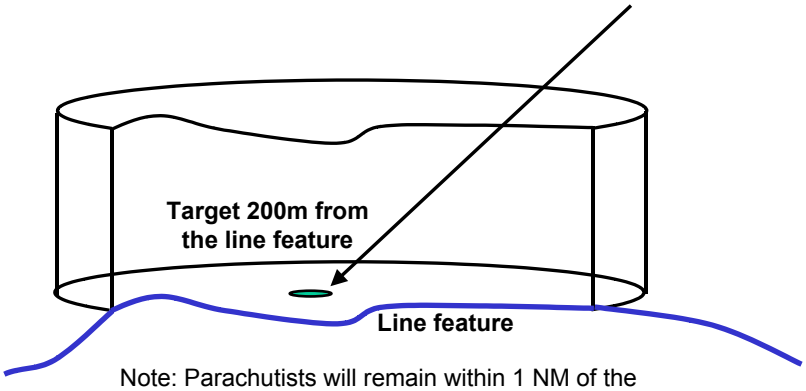
10.11.1.3 Where two or more PJE Drop Zones are located in close proximity and parachute operators have mutually agreed to accept self-separation, ATC is required to pass only traffic information to the participating operators. A participating pilot may request a separation service, but must continue to self-separate until ATC is satisfied that a separation standard has been achieved, and can be maintained. Agreements established between parachute operators to self-separate must be documented in ATS Local Instructions.

10.11.2 Limitations and Extensions – PJE

10.11.2.1 For separation purposes, ATC must base separation on the fact that the parachutist will be dropped within a 1 NM radius of the target. If an extension of this area is necessary, the pilot must advise ATS of the distance and direction this extension is required. The navigational tolerance area must be extended in the advised direction until receipt of advice that the drop is completed. These requirements should be reiterated in any briefing.



10.11.2.2 Where parachutists agree to remain to one side of a defined line feature, and the target is set at least 200 M away from the closest point of the line feature, the navigational tolerance area of the parachutists may be reduced to the line feature. The line feature may only be used when the drop will occur from 10,000 FT or below, by day in VMC, and the service provider agrees to the use of the line feature. A letter of agreement between the parachute jumping group and ATS must be established.



Note: Parachutists will remain within 1 NM of the target on the same side of the line feature

10.11.2.3 The instructions described above should be issued by directly briefing the parachutists prior to the exercise. They may also be relayed to the parachutists by the PJE aircraft pilot.

10.11.2.4 Parachutists may be assigned responsibility to remain within certain limits of, and on a particular side of a geographical fix (e.g. “PARACHUTISTS REMAIN WITHIN 1 NM OF THE TARGET AND TO THE WEST OF (line feature)”).

10.11.2.5 Responsibility for separation of parachutists from another aircraft must only be assigned to the PJE aircraft.

10.11.2.6 Lateral separation may be achieved between the parachutists and the non-PJE aircraft by a requirement stipulated to the parachutists in accordance with the use of a line feature for separation, and the application of visual tracking tolerances to the aircraft.

10.11.2.7 After the parachutists have exited, and the PJE aircraft has commenced descent, only the pilot of the PJE aircraft can be assigned the responsibility for separation from other aircraft.

10.11.2.8 Visual separation between the parachutists and a non-PJE aircraft, by TWR or the PJE pilot is limited to circumstances where that aircraft is 7,000 KG or less. This accounts for wake turbulence.

10.11.2.9 When TWR is applying visual separation in the circuit area, the 7,000 KG weight limitation does not apply, so long as ATC is satisfied that the parachutists will remain safely clear of the wake turbulence.

10.11.3 High Altitude Balloons

10.11.3.1 A letter of agreement must be signed between the relevant Operations Centre and the balloon operator prior to commencement of operations, and must detail:

(a) notification procedures;

(b) communication requirements;

(c) launch and cutdown procedures; and

(d) restrictions on particular time blocks for launches due to increased RPT traffic on adjacent upper air routes.

10.11.3.2 A navigation tolerance of ±15 NM must be applied to high altitude balloons. ATC must apply a 1 NM buffer between the navigation tolerances of an aircraft and a high altitude balloon.

10.11.3.3 When plotting the predicted track of the balloon, ATC must apply a tolerance of ±15 NM radius drawn at:

(a) the departure point;

(b) the FL200 predicted position; and

(c) the FL600 predicted position.

10.11.3.4 The predicted track must be redrawn using the FL200 actual position, and must incorporate and updated track information.

10.11.4 Manned Balloon Operations

10.11.4.1 Balloons must be separated from other airspace users, and issued relevant information at all altitudes according to the classification of airspace in which the balloon is flown.

10.11.4.2 Separation requirements that apply to aircraft weighing less than 5,700 KG must also apply to balloons.

10.11.4.3 Passing traffic information on other balloons within an authorised formation is not required.

10.11.5 Unmanned Aerial Vehicles (UAV)

10.11.5.1 Unmanned Aerial Vehicles must be separated from other aircraft using the separation standards applicable to manned aircraft when:

(a) capable of presenting real time navigational information using approved navigation systems; and

(b) continuous two way communications is maintained between the operator and the ATC unit.

10.11.6 ACAS/TCAS Resolution Advisory Action

10.11.6.1 Once the aircraft has begun a manoeuvre in response to an Resolution Advisory (RA), the controller is not responsible for providing separation between the aircraft that is responding to a RA and any other aircraft, airspace, terrain or obstruction.

10.11.6.2 If an aircraft advises that it is responding to an ACAS/TCAS RA, ATC shall:

(a) not issue instructions that contradict those issued by the RA;

(b) issue safety alerts; and

(c) provide relevant traffic information as appropriate.

10.11.6.3 Responsibility for separation resumes when separation is re-established after:

(a) the responding aircraft has returned to its assigned level;

(b) the aircraft advises that the ACAS/TCAS manoeuvre is completed; or

(c) the responding aircraft has executed an alternate clearance.

10.11.7 Unspecified Operations

10.11.7.1 Separation requirements from operations for which standards have not been specified must be:

(a) distributed by NOTAM; or

(b) determined through direct liaison with the affected ATS unit.

10.11.7.2 The following buffers must be added to the parameters of the operations:

(a) 1 NM buffer to the notified geographical coordinates of the activity;

(b) 15 MIN before and after the notified time of the activity;

(c) at least 500 FT to the maximum notified altitude of the activity.

Section 10.12: Separation Standards—Wake Turbulence

10.12.1 Interpretation

10.12.1.1 In this section, the following applies:

(a) for lateral extent, when applying wake turbulence separation, directly behind means that an aircraft is operating within 760 m of the flight path of the aircraft in front of it.

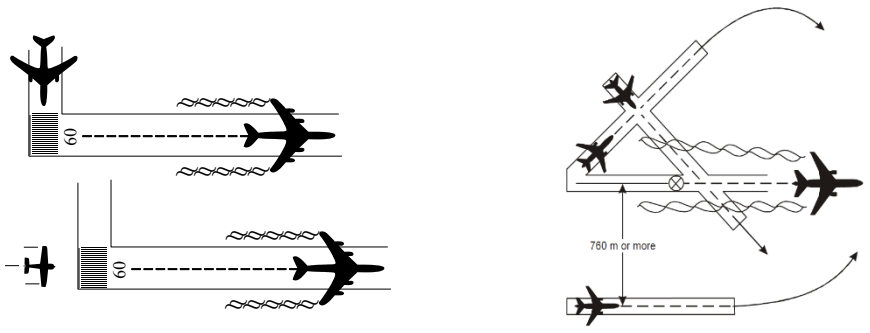
(b) intermediate part — ICAO PANS-ATM, of a runway, including of a parallel runway separated from the runway by less than 760 m, means a point more than 150 m after the take-off commencement point of the preceding aircraft using the runway or the parallel runway.

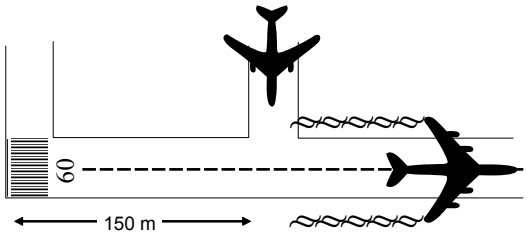
10.12.1.2 In addition to the categories of aircraft specified in PANS-ATM, the Airbus A380 is taken to constitute the SUPER wake turbulence category of aircraft.

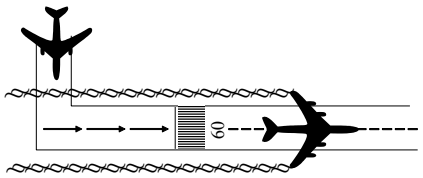
10.12.2 Wake Turbulence Separation Minima

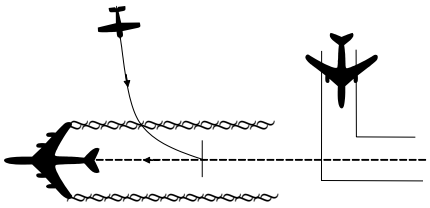
10.12.2.1 Time-based wake turbulence separation minima

Full length or crossing runway operations, or crossing flight paths			
Aircraft Categories		**Separation Minima**	
Leading aircraft	**Following aircraft**	**Departure (Minutes)**	**Arrival (Minutes)**
SUPER	HEAVY	2	3
	MEDIUM	3	3
	LIGHT	3	4
HEAVY	MEDIUM	2	2
	LIGHT	2	3
MEDIUM fixed-wing aircraft with MTOW of 25 000 kg or more, and all MEDIUM helicopters	LIGHT	2	3

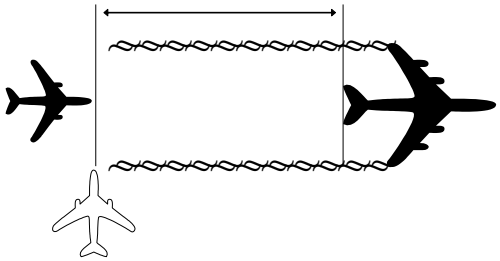


Intermediate Departures			
Aircraft Categories		**Separation Minima**	
Leading aircraft	**Following aircraft**	**(Minutes)**	**Application**
SUPER	HEAVY	4	Intermediate Departures minima must be applied when a following aircraft will commence take-off from an intermediate part more than 150 m after the take-off commencement point of the preceding aircraft, using the same runway or a parallel runway separated by less than 760 m.
	MEDIUM	4	
	LIGHT	4	
HEAVY	MEDIUM	3	
	LIGHT	3	
MEDIUM fixed-wing aircraft with MTOW of 25 000 kg or more, and all MEDIUM helicopters	LIGHT	3	
			

Displaced Landing Threshold		
Aircraft Categories		**Separation Minima**
Arriving aircraft	**Departing aircraft**	**(Minutes)**
SUPER	HEAVY	3
	MEDIUM	3
	LIGHT	3
HEAVY	MEDIUM	2
	LIGHT	2
MEDIUM fixed-wing aircraft with MTOW of 25 000 kg or more, and all MEDIUM helicopters	LIGHT	2
		

Opposite Direction		
Aircraft Categories		**Separation Minima (Minutes)**
SUPER	HEAVY	3
	MEDIUM	3
	LIGHT	3
HEAVY	MEDIUM	2
	LIGHT	2
MEDIUM fixed-wing aircraft with MTOW of 25 000 kg or more, and all MEDIUM helicopters	LIGHT	2
		

10.12.2.2 Distance-based wake turbulence separation

Distance-based wake turbulence separation		
Aircraft Categories		**Separation Minima**
Leading aircraft	**Following aircraft**	**(NM)**
SUPER	HEAVY	6
	MEDIUM	7
	LIGHT	8
HEAVY	HEAVY	4
	MEDIUM	5
	LIGHT	6
MEDIUM fixed-wing aircraft with MTOW of 25 000 kg or more, and all MEDIUM helicopters	LIGHT	5
		

10.12.3 Application

10.12.3.1 Subject to subsection 10.12.3.3, ATC must apply an appropriate wake turbulence separation minimum in all controlled airspace when an aircraft is:

(a) operating directly behind another aircraft's flight path; and

(b) at the same level as the other aircraft, or less than 1 000 ft below it.

10.12.3.2 Subject to subsection 10.12.3.3, ATC must apply appropriate wake turbulence separation minima to aerodrome traffic when:

(a) both aircraft are using the same runway for take-off or for landing; or

(b) an aircraft taking-off behind a landing heavier wake turbulence category aircraft is expected to become airborne before the touchdown point of the landing aircraft; or

(c) an aircraft is taking-off and a preceding departing aircraft on a crossing runway has rotated at or before the runway intersection; or

(d) an aircraft is landing and could still be airborne at the intersection of a crossing runway and a preceding departing aircraft on that crossing runway has rotated at or before the intersection; or

(e) a LIGHT aircraft during its landing run will cross the intersection of a crossing runway behind a departing HEAVY aircraft on that crossing runway which has rotated at or before the intersection; or

(f) using parallel runways for approach and departures when the runways are separated by less than 760 m; or

(g) an aircraft is using the opposite direction runway for take-off or landing to a heavier category aircraft that has taken off or executed a missed approach.

10.12.3.3 ATC is not required to apply wake turbulence separation in the following situations:

(a) when a MEDIUM fixed-wing aircraft of less than 25 000 kg MTOW precedes a LIGHT aircraft;

(b) when an aircraft is landing behind another aircraft that is taking-off on the same runway;

(c) subject to 10.12.3.4, if a pilot has initiated a waiver of the relevant departure wake turbulence separation minimum;

(d) when a VFR aircraft is in flight and is:

(i) operating directly behind a preceding HEAVY or MEDIUM aircraft; or

(ii) landing on the same runway as a preceding HEAVY or MEDIUM aircraft; or

(iii) landing on a parallel runway separated by less than 760 m from the runway of a preceding HEAVY or MEDIUM aircraft;

(e) when an IFR aircraft is in flight and the pilot has:

(i) reported the preceding aircraft in sight; and

(ii) accepted responsibility to follow, or maintain his or her own separation with, that aircraft.

> **Note:** For paragraphs (d) and (e), the pilot in command of the aircraft is responsible for ensuring that the spacing from a preceding aircraft of a heavier wake turbulence category is acceptable. If it is determined that additional spacing is required, the flight crew may inform ATC accordingly, stating their requirements.

10.12.3.4 For a LIGHT or MEDIUM aircraft, ATC must not waive the relevant wake turbulence separation minimum if the aircraft is taking-off after a HEAVY or SUPER aircraft has:

(a) used the same runway in the same or reciprocal direction; and

(b) taken-off or made a low or missed approach.

10.12.3.5 ATC must issue a wake turbulence caution to the pilot of an aircraft if:

(a) less than the applicable wake turbulence separation minima may exist; or

(b) the applied wake turbulence separation minima may be infringed; or

(c) the pilot has waived the relevant departure wake turbulence separation requirement; or

(d) wake turbulence separation is not provided because of paragraph 10.12.3.3 (d) or (e), and wake turbulence may have an adverse effect on the aircraft.

10.12.3.6 In applying wake turbulence separation minima, air traffic controllers must:

(a) when using a time minimum between aircraft taking-off, ensure that a following aircraft does not become airborne until the specified time interval has elapsed since the leading aircraft became airborne;

(b) when using a time minimum between an aircraft executing a missed approach and the following aircraft taking-off, not issue the take-off clearance until the specified time interval has elapsed since the preceding aircraft crossed the threshold or initiated the missed approach (whichever occurs later);

(c) when using an ATS surveillance system minimum between aircraft taking off, ensure that the appropriate separation minimum exists between the aircraft at or before the time the following aircraft becomes airborne;

(d) when aircraft are using the same runway, ensure that the landing minimum will exist at the time the leading aircraft is over the landing threshold;

(e) when crossing runways are in use, apply the full length minima and ensure that the required separation exists at the intersection.

10.12.3.7 If the required wake turbulence separation can be determined by distance using an aircraft report or ATS surveillance system, ATC is not required to apply the relevant time minimum:

(a) between arriving aircraft; or

(b) unless the aircraft following will commence take-off from an intermediate point — between departing aircraft.

> **Note** **Intermediate point** is explained in subsection 10.12.1.

10.12.3.8 Due to the wake turbulence characteristics of the B757 and H47, for the purpose of wake turbulence separation, these aircraft must be classified as a HEAVY aircraft if leading and as a MEDIUM aircraft if following.

Section 10.13: Separation Standards—Aerodrome

10.13.1 Taxiing and Runway Standards

10.13.1.1 The separation of aircraft taxiing on the manoeuvring area is a joint pilot and controller responsibility.

10.13.1.2 When providing runway separation, the wake turbulence standards must be applied in conjunction with the runway standards.

10.13.1.3 Runway separation standards apply equally to runway operations or to a strip having a single landing and take-off path.

10.13.1.4 When take-off or landing separation is based on the position of a preceding landing or taxiing aircraft and visual determination is limited, particularly at night or in reduced visibility, by poor azimuth resolution or other factors, the pilot of that aircraft must be instructed to report when the aircraft has:

(a) crossed and is clear of a runway intersection; or

(b) stopped short of a runway strip; or

(c) vacated the runway.

10.13.1.5 As local circumstances such as aerodrome configuration and day/night visibility conditions may restrict controller visibility, unit Instructions must specify when mandatory confirmation of position is required from the pilot.

10.13.2 Arriving Aircraft and an Aircraft Taking Off

10.13.2.1 Lateral separation is considered to exist between an arriving aircraft that subsequently commenced final approach, and a departing aircraft that has been cleared on a segregated flight path.

10.13.2.2 For this purpose, a segregated flight path is considered to exist when the departing aircraft will not be manoeuvring within 45 degrees either side of the

reciprocal of the final approach path while the arriving aircraft is on the final approach track.

10.13.2.3 Except as specified in subsections 10.13.2.4 and 10.13.2.5, take-offs must not be permitted after an arriving aircraft has commenced final approach until:

(a) it is sighted by the tower controller and reasonable assurance exists that a landing can be accomplished; or

(b) separation standards can be applied between an arriving aircraft which misses its approach and an aircraft desiring take-off clearance.

10.13.2.4 When the take-off direction differs by at least 45 degrees from the reciprocal of a straight-in final approach, a departing aircraft may commence take-off before an arriving aircraft on final approach passes a point 5 NM from the landing threshold as determined by 1 of the following:

(a) ATS surveillance system;

(b) GNSS report;

(c) DME report adjusted for the distance between the landing threshold in use and the DME site.

10.13.2.5 In the application of this standard, the controller must estimate that the required separation will exist at the time the take-off is commenced, and ATS surveillance system observation or DME report must be used to confirm that separation is not infringed.

10.13.2.6 For subsections 10.13.2.3 and 10.13.2.4, when an ATS surveillance system suitable for 3 NM separation is used to determine aircraft position, the controller must ensure that an arriving aircraft is not closer than 3 NM from the landing threshold at the time a departing aircraft:

(a) commences take-off on the runway to be used by the landing aircraft; or

(b) crosses the intersection of the runway to be used by the landing aircraft.

10.13.3 Simultaneous Parallel Operations

10.13.3.1 Use by fixed wing aircraft of more than one landing/take-off path in the same direction on the one aerodrome is permissible if, the paths proposed to be used are treated as one runway for separation purposes.

10.13.3.2 The suitability of a landing area for simultaneous parallel landings or take-offs by fixed wing aircraft and the associated control procedures must be established in consultation with CASA.

10.13.4 Training Approaches

10.13.4.1 If an aircraft, person or vehicle within the runway strip on a controlled aerodrome is likely to be overflown by an aircraft making a training approach, the controller must:

(a) instruct the training aircraft not to descend below:

(i) the relevant minimum altitude for the approach; or

(ii) for a practice visual approach — not below 300 ft AGL; and

(b) pass traffic information to the other aircraft before it enters the flight path over which the approaching aircraft will fly; and

(c) pass traffic information to persons, including the drivers of vehicles, operating within the runway strip of the runway to be overflown by the aircraft, other than persons operating within the works area associated with a displaced threshold.

10.13.5 Land and Hold Short Operations (LAHSO)

10.13.5.1 Notwithstanding aerodrome separation standards, operations by an aircraft landing on one runway and another aircraft either taking off or landing simultaneously on a crossing runway may be permitted subject to the provisions of LAHSO.

10.13.5.2 LAHSO are to be considered a 'dependent' procedure, with participating aircraft classified as either:

(a) **Active:** when an aircraft is issued a hold short requirement and is alerted about traffic on a crossing runway; or

(b) **Passive:** when an aircraft has unrestricted use of the full runway length and is alerted about traffic on a crossing runway.

10.13.5.3 Active participation in LAHSO is available only to pilots of aircraft in the following categories:

(a) Australian registered aircraft of performance categories A, B, or C engaged in operations conducted under a training and checking organisation approved under regulation 217 of the *Civil Aviation Regulations 1988*, if the operator provides Operations Manual information and certifies participating pilots for LAHSO;

(b) Australian registered aircraft of performance category A, B, or C, if the pilot holds a log book endorsement for LAHSO;

(c) Australian military aircraft in performance categories A, B, or C;

(d) foreign military aircraft in performance categories A, B, or C, if there is a letter of agreement between the relevant military authority and the ATS provider;

(e) Australian registered aircraft approved in writing by CASA.

10.13.5.4 Passive participation in LAHSO is available to pilots of aircraft in the following categories:

(a) Australian civil and military aircraft of performance category A, B and C at pilot discretion;

(b) RAAF Hawk, F111 and FA18 aircraft;

(c) foreign military aircraft, if there is a letter of agreement, between the relevant military authority and the ATS provider, that excludes foreign military aircraft of performance category D.

10.13.5.5 Pilots who at the time expect and elect to participate actively in LAHSO, must on receipt of an ATIS broadcast that advises LAHSO in progress, confirm ability to participate by advising “LAHSO APPROVED” to the last en-route ATS provider prior to descent into the destination terminal area or on initial contact with Tower or Approach.

10.13.5.6 Pilots of civil aircraft operating under a flight number as advised in flight notification, and pilots of Australian military aircraft, may omit the words “LAHSO APPROVED” as required above. ATC may sequence these aircraft for LAHSO unless the pilot expressly states an intention not to participate.

10.13.5.7 Notwithstanding the provisions above, pilots of foreign registered civil aircraft and of Australian registered aircraft operating under foreign air carrier flight numbers must not be permitted to participate actively or passively in LAHSO.

10.13.5.8 LAHSO must only be permitted as follows:

(a) runways are equipped with standard LAHSO signs, lights and runway markings as specified in AIP Aerodromes (AD);

(b) the ceiling is not less than 1,000 FT and visibility is not less than 5,000 M;

(c) ‘active’ participation is restricted to runways where the crosswind component including gusts does not exceed 20 KT;

(d) simultaneous landings may be permitted by day and night;

(e) a simultaneous take-off and landing is only permitted by day;

(f) a “HOLD SHORT” requirement must not be given when low level wind shear of intensity greater than LIGHT is reported;

(g) when the runway is damp or wet, a “HOLD SHORT” requirement must only be issued if the braking characteristics are assessed as GOOD by a pilot of an aircraft in the same performance category.

10.13.5.9 In the application of LAHSO, controllers must:

(a) ensure that the published distance from the landing threshold to the hold short point of the crossing runway is adequate for the performance category of the aircraft as detailed in the Landing Distance Required (LDR) table below;

(b) alert aircraft that land and hold short runway operations are in progress by notification on the ATIS;

(c) issue directed traffic information to both aircraft participating in the procedure;

(d) ensure readback of a hold short requirement;

(e) withhold issuing a take-off clearance to a departing aircraft while another aircraft is landing on a crossing runway having been issued

with a duly acknowledged hold short requirement, until such time that in the opinion of the controller, there is no possibility that both aircraft could occupy the intersection at the same time should the landing aircraft subsequently fail to hold short.

10.13.5.10 When circumstances warrant, controllers may require a pilot issued with a hold short requirement to report "(callsign) HOLDING SHORT".

10.13.5.11 When an issued hold short instruction no longer applies, pilots must be advised that "FULL RUNWAY LENGTH NOW AVAILABLE".

10.13.5.12 When a landing aircraft has been issued with requirements to hold short of a crossing runway strip, aircraft and vehicles may be approved to cross the 'non operational' end of the runway in the following circumstances:

(a) by day;

(b) at the discretion of, and under the jurisdiction of the aerodrome controller;

(c) traffic information must be provided.

10.13.6 Landing Distance Required (LDR) for LAHSO

10.13.6.1 ATC may sequence participating aircraft for LAHSO regardless of category of aircraft if the controller is aware that the aircraft may be able to land within the landing distance available (LDA). In all circumstances, the pilot is responsible for determining that the LDA is sufficient in the prevailing conditions. ATC may sequence non-jet Category B aircraft below 5,700 KG MTOW for LAHSO using Category A LDRs.

10.13.6.2 The LDR table below shows the approved minimum LDR for an aircraft Performance Category (PC) in the conditions specified and must be used as a guide for ATC when determining whether an aircraft can land in the available runway distance while participating in LAHSO.

10.13.6.3 Reduced LDRs, as determined by CASA, may be applied provided a Letter of Agreement between the ATS Provider/Department of Defence and an aircraft operator that has been approved by the local CASA District Office. These LoAs must be promulgated in Local Instructions.

Table 10.13-1: Landing Distance Required

	Temperature	30° and Below		Above 30°	
	RWY Status	Dry	Damp/Wet	Dry	Damp/Wet
PC	Headwind (KT)	LDR in Metres			
A	30	780	900	810	930
	20	820	940	840	970
	10	860	990	890	1020
	0	900	1040	930	1070
	–5	990	–	1020	–
B	30	1220	1400	1250	1440
	20	1270	1460	1610	1510
	10	1330	1530	1370	1580
	0	1400	1610	1440	1660
	–5	1540	–	1590	–
C	30	1570	1800	1610	1850
	20	1640	1880	1690	1940
	10	1710	1970	1760	2030
	0	1800	2070	1850	2130
	–5	1980	–	2040	–

1. These figures apply only to aerodromes 0 to 500 FT.
2. For operations at aerodromes between 500 and 2,500 FT the LDR is calculated by multiplying the figure obtained from the table by a factor of 1.2.
3. For QNH below 997 HPa, multiply the LDR by a factor of 1.1.
4. Interpolation is permitted between rows and columns (for similar conditions of temperature and runway status) for each aircraft PC.
5. The table must not be used when the runway slope exceeds one percent down.

10.13.7 Letters of Agreement for LAHSO

10.13.7.1 A Letter of Agreement between the relevant ATS provider and any foreign military authority must be raised by the ATS unit following an initial request from the relevant military authority.

10.13.7.2 The Letter of Agreement must include, but is not limited to, the following items:

(a) the specific aerodrome at which the Agreement is valid;

(b) the ATC service provider bound by the Agreement;

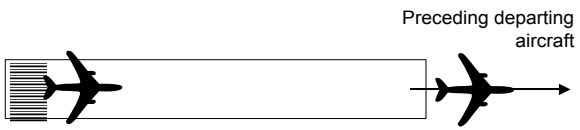
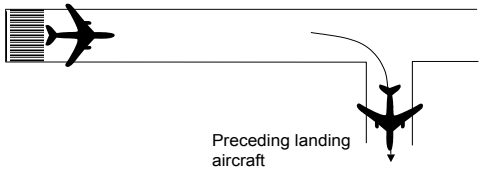
(c) foreign military authority bound by the Agreement;

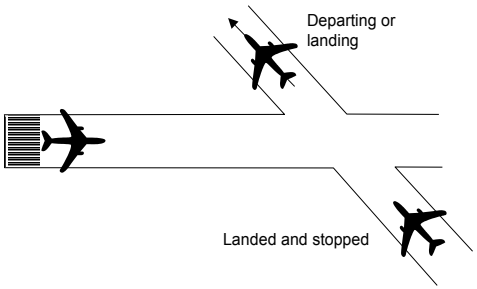
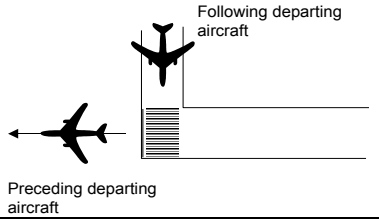
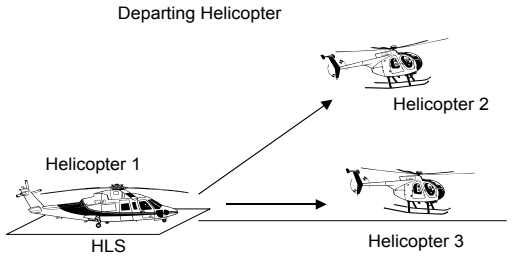
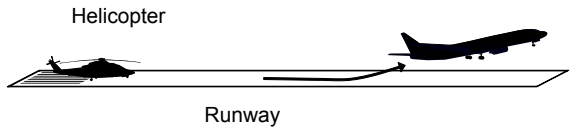
(d) a validity period;

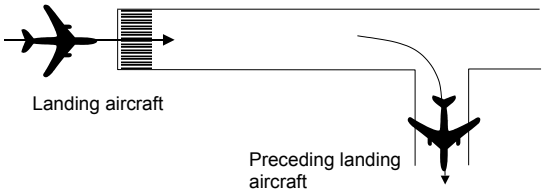
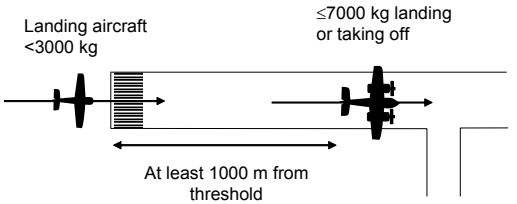
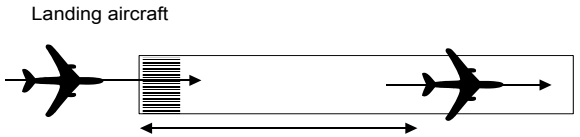
(e) the LAHSO procedures that are the subject of the Agreement;

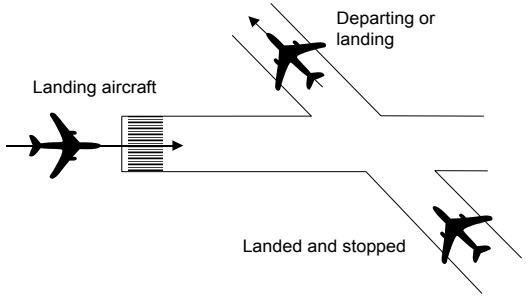
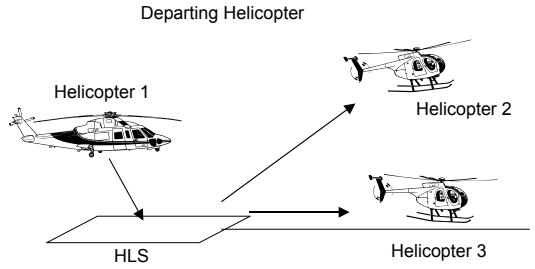
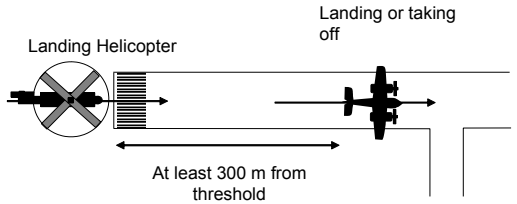
(f) a statement authorising active and/or passive participation by pilots of specified aircraft types and categories.

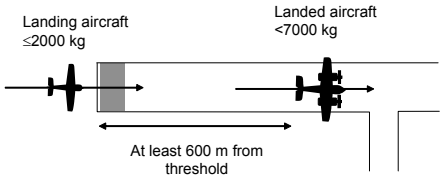
10.13.8 Runway Separation Minima

Minimum	Application	Conditions	Diagram
Take-off behind a preceding departing aircraft	Fixed Wing Aircraft	A departing aircraft must not be permitted to commence take-off until the preceding departing aircraft: 1. has crossed the up-wind end of the runway-in-use; or 2. has commenced a turn; or 3. is airborne and has reached a point at least 1 800 m (6 000 ft) ahead of the following aircraft, the runway is longer than 1 ,800 m (6 000 ft) and the distance can be readily determined; or 4. is airborne and has reached a point at least 600 m (2 000 ft) ahead of the following aircraft, and: (a) the preceding aircraft has a MTOW of 7 000 kg or less; and (b) the following aircraft has an MTOW of less than 2 000 kg; and (c) the following aircraft is slower than the preceding aircraft; or 5. is airborne and has reached a point at least 600 m (2 000 ft) ahead of the following aircraft, and both aircraft have an MTOW of less than 2 000 kg.	
Take-off behind preceding landing aircraft	Fixed Wing Aircraft	The departing aircraft must not be permitted to commence take-off until the preceding aircraft has vacated and is taxiing away from the runway; and, if applicable, the appropriate wake turbulence separation has been achieved.	

Minimum	Application	Conditions	Diagram
Take-off behind landing or departing aircraft on intersecting runways	Fixed Wing Aircraft	A departing aircraft must not be permitted to commence take-off until: 1. a preceding departing aircraft on an intersecting runway has crossed the intersection; or 2. an aircraft landing on the crossing runway has either crossed the intersection or stopped short.	
Take-off after an aircraft has departed in the opposite direction	Fixed Wing Aircraft	A departing aircraft must not be permitted to commence take-off until: 1. the preceding aircraft has crossed the point at which the following aircraft will commence take-off; and 2. if applicable, the appropriate wake turbulence separation standard has been achieved.	
Take-off behind a previous departing helicopter	Helicopters departing from an HLS	Helicopter (1) may be cleared for take-off when a preceding departing helicopter (2) has departed the HLS, or a preceding arriving helicopter (3) has moved clear of the HLS.	
Helicopter taking-off behind a preceding departing aircraft	Where the helicopter uses a runway for a take-off roll	A departing helicopter must not be permitted to commence take-off until: 1. the preceding departing aircraft is airborne; and 2. ATC ensures visual separation is in place; and 3. if applicable, the appropriate wake turbulence separation standard has been achieved.	

Minimum	Application	Conditions	Diagram
Landing behind a preceding landing aircraft	Fixed Wing Aircraft	A landing aircraft must not be permitted to cross the runway threshold until the preceding aircraft has vacated and is taxiing away from the runway.	
Landing behind preceding departing or landing aircraft	Fixed Wing Aircraft	A landing aircraft must not be permitted to cross the runway threshold unless, in the opinion of the tower controller, no collision risk exists, and: 1. the landing aircraft has an MTOW below 3 000 kg and is a Performance Category A aircraft; and 2. the preceding aircraft has an MTOW of 7 000 kg or less, and: (a) if landing, will vacate the runway without backtracking; or (b) if departing, is at least 1 000 m from the runway threshold, and has commenced its take-off run.	
Landing behind a preceding departing aircraft	Fixed Wing Aircraft	The landing aircraft must not be permitted to cross the runway threshold until the preceding aircraft is airborne and: 1. has commenced a turn; or 2. is beyond the point on the runway at which the landing aircraft could be expected to complete its landing roll and there is sufficient distance to enable the landing aircraft to manoeuvre safely in the event of a missed approach.	

Minimum	Application	Conditions	Diagram
Landing after intersecting runway traffic	Fixed Wing Aircraft	The landing aircraft must not be permitted to cross the runway threshold until a preceding departing or landing aircraft on an intersecting runway has either crossed the intersection or stopped short.	
Landing Helicopter Landing – HLS	Helicopter	A helicopter (1) may be cleared to land when a departing helicopter (2) has left the HLS, or a preceding arriving helicopter (3) has moved clear of the HLS.	
Landing **Helicopter Landing – Runway**	Helicopter	A landing helicopter may be permitted to land when: 1. the preceding landing or departing aircraft is at least 300 m down the runway from the landing threshold; and 2. in the opinion of tower controller, no collision risk exists.	

Minimum	Application	Conditions	Diagram
Landing behind a preceding landing aircraft	Applies only where: (a) the following landing aircraft has an MTOW of 2 000 kg or less; and (b) the preceding aircraft has an MTOW of less than 7 000 kg.	The landing aircraft must not be permitted to cross the runway threshold until the preceding aircraft: (a) has landed; and (b) has passed a point at least 600 m from the threshold of the runway; and (c) is still in motion; and (d) will vacate the runway without backtracking.	

CHAPTER 11: INFORMATION PROVIDED TO PILOTS

Section 11.1: General

11.1.1 Take-off or Landing Information

11.1.1.1 Changes to ATIS wind information must be provided to pilots with a take-off or landing clearance if it is considered that it would be of significance to the aircraft operation.

11.1.1.2 The ATIS code 'ZULU' must be retained exclusively in all locations for use only with ATIS broadcasts relating to out of hours operations or when a control zone is de-activated.

11.1.1.3 ATIS ZULU:

(a) must include the following:

(i) the expected re-opening time of the Tower;

(ii) CTAF and PAL frequency;

(iii) the preferred runway or circuit direction;

(iv) noise abatement procedures;

(v) works in progress; and

(b) may include operational information of an unchanging nature which provides immediately useful information to pilots.

11.1.2 Safety Alerts

11.1.2.1 A safety alert must be issued to an aircraft when a controller is aware the aircraft is in a situation which is considered to place it in unsafe proximity to terrain, obstructions, or other aircraft.

11.1.2.2 Once the pilot advises that action is being taken to resolve the situation, the issuance of further alerts may be discontinued.

11.1.3 Altimetry

11.1.3.1 Information concerning Transition Altitude and Transition Layer can be found in AIP ENR 1.7.

11.1.3.2 The differences between Area QNH for adjacent zones and terminal areas must not exceed 5 hectopascals. On the occasions that ATS observe a difference greater than 5 hectopascals between the terminal QNH and the forecast Area QNH, ATS must notify the appropriate meteorological office immediately.

11.1.4 Traffic Information

11.1.4.1 In providing ATS surveillance services within controlled airspace, including Class E airspace, or designated restricted airspace, ATC has no

responsibility to initiate avoiding action in respect of unknown aircraft which can reasonably be assumed to be outside controlled airspace.

11.1.4.2 ATC must advise aircraft leaving controlled airspace of observed traffic within the airspace to be entered where:

(a) the pressure altitude derived level information of observed traffic indicates it is operating within 2000 FT of the base of CTA; or

(b) in the opinion of the controller other information indicates a potential conflict exists.

11.1.4.3 In Class G airspace, IFR and MLJ aircraft must be provided with traffic information on other conflicting IFR and MLJ aircraft.

11.1.4.4 In Class E airspace, flights:

(a) maintaining VFR-on-top; or

(b) operating VFR climb/descent; or

(c) using IFR Pick-up;

must be provided with:

(d) mutual traffic information:

(i) on each other; and

(ii) on IFR and MLJ flights; and

(e) traffic information on VFR flights as far as practicable.

Note Provision of traffic information is based on flight category, and not on the chosen procedure at the time of the request.

11.1.4.5 If the pilot in command of an IFR or MLJ aircraft at a non-towered aerodrome reports to the unit providing an ATS for the aerodrome that his or her aircraft is taxiing at or airborne from, the aerodrome, the unit must inform the pilot of conflicting traffic which is not on the CTAF.

11.1.4.6 The unit providing an ATS for a non-towered aerodrome must inform IFR or MLJ aircraft inbound to the aerodrome of conflicting traffic regardless of where the confliction will occur. However, this obligation ceases when the pilot reports “CHANGING CTAF” or that he or she is changing to the MULTICOM frequency.

CHAPTER 12: INFORMATION TRANSFER

Section 12.1: General

12.1.1 Validity of an ATC Clearance

12.1.1.1 An ATC clearance, and its amendments during the flight apply only:

(a) to the first point at which the aircraft leaves controlled airspace; or

(b) to the first landing point if the flight is wholly within controlled airspace; or

(c) to the clearance limit if issued; or

(d) until the expiration of a clearance void time; or

(e) until cancelled by a controller.

12.1.2 Level Assignment

12.1.2.1 Clearances issued must enable the pilot to comply with CAR 157.

12.1.2.2 Block Level Clearances must not be issued to:

(a) civil aircraft in Class E airspace; or

(b) aircraft to which the Mach Number Technique has been applied.

12.1.2.3 Unless ATC instructs otherwise, a pilot intending to land at an aerodrome within Class D airspace may descend to join the aerodrome traffic circuit after he or she has established 2-way communications with the Tower.

12.1.3 Clearances for Special VFR Aircraft

12.1.3.1 At pilot request, a SPECIAL VFR clearance may be issued for a VFR flight when:

(a) within a control zone;

(b) in a control area next to a control zone for the purpose of entering or leaving the zone;

(c) by day;

(d) when VMC do not exist; and

(e) an IFR flight will not be unduly delayed.

12.1.3.2 In the application of Special VFR, the following are Australian requirements, which differ from those stated in ICAO PANS-ATM:

(a) Special VFR is not available in Class E airspace.

(b) Visibility assessment is the responsibility of the pilot.

12.1.4 Clearances Below LSALT

12.1.4.1 A pilot may be assigned a level below the LSALT provided that:

(a) the pilot has reported “VISUAL”; and

(b) “VISUAL” is appended to the level assigned; and

(c) by night, the clearance is prefixed with “WHEN ESTABLISHED IN THE CIRCLING AREA”.

12.1.4.2 ATC may authorise operations below the LSALT to the pilot of a military or Coastwatch flight when requested by the pilot of the operation for operational reasons. This procedure does not substitute for the conditions of a visual approach at night.

12.1.5 Clearance Limits

12.1.5.1 When a clearance limit is cancelled, an onwards clearance specifying the level and route to be flown from that point must be issued.

12.1.5.2 A description of a holding path to be flown at the clearance limit is not required when:

(a) the holding point is published in aeronautical documents;

(b) a clearance limit has been imposed temporarily and it is expected that the requirement to hold will have elapsed before the aircraft arrives at the designated holding point.

12.1.6 Clearance Readbacks

12.1.6.1 ATS personnel must ensure that those elements identified in AIP are to be read back correctly by the pilot.

12.1.7 Transfer of identification

12.1.7.1 Transfer of identification may be carried out by 1 of the following methods:

(a) designation of the position indication by automated means, if only 1 position indication is indicated and there is no possible doubt of correct identification;

(b) notification of the aircraft’s discrete SSR code or aircraft address;

(c) notification that the aircraft is SSR Mode S-equipped with an aircraft identification feature when SSR Mode S coverage is available;

(d) notification that the aircraft is ADS-B equipped with an aircraft identification feature when compatible ADS-B coverage is available;

(e) direct designation (pointing with the finger) of the position indication, if the 2 situation displays are adjacent, or if a common conference type of situation display is used;

> **Note:** Attention must be given to any errors which might occur due to parallax effects.

(f) designation of the position indication by reference to, or in terms of, bearing and distance from a geographical position or navigational

facility accurately indicated on both situation displays, together with the track of the observed position indication if the route of the aircraft is not known to both controllers;

> **Note:** Caution must be exercised before transferring identification using this method, particularly if other position indications are observed on similar headings and in close proximity to the aircraft under control. Inherent radar deficiencies, such as inaccuracies in bearing and distance of the radar position indications displayed on individual situation displays and parallax errors, may cause the indicated position of an aircraft in relation to the known point to differ between the 2 situation displays.

(g) the transferring controller instructing the aircraft to change SSR code, and the accepting controller observing the change;

(h) the transferring controller instructing the aircraft to squawk/transmit IDENT, and the accepting controller observing this response.

> **Note:** Use of procedures (g) and (h) requires prior coordination between the controllers, since the indications to be observed by the accepting controller are of short duration.

12.1.8 Clearance by Establishment of 2-way Communications

12.1.8.1 For this subsection, 2-way communication is established if ATC responds to a pilot's radio call with the aircraft's radio identification.

12.1.8.2 In addition to issuing a pilot with a specific clearance or instruction, ATC may authorise an aircraft to enter Class D airspace by establishing 2-way communication with it.

> **Notes:**
> 1 If ATC responds to a radio call with the aircraft identification (generally including an instruction or report requirement), 2-way radio communications have been established and the pilot can enter the Class D airspace.
> 2 If ATC responds to the initial radio call without using the aircraft identification, 2-way radio communication has not been established and the pilot may not enter the Class D airspace.
> 3 If workload or traffic conditions prevent immediate entry into the Class D airspace, ATC should expressly instruct the pilot to remain outside the Class D airspace.
> 4 The pilot of an aircraft is required to comply with any instruction that ATC includes with the establishment of 2-way communication, including an instruction to remain outside the Class D airspace.

Section 12.2: En-route/Terminal Clearances

12.2.1 Departure Clearances

12.2.1.1 Where SIDs are published, they must be issued to IFR aircraft departing at night, or by day in IMC.

12.2.1.2 Tracking instructions must be specified when:

(a) SIDS are not published; or

(b) a SID is cancelled; or

(c) a visual departure clearance is issued in VMC by day in lieu of a SID; or

(d) aircraft or ground based navigation aid(s) are not available.

12.2.1.3 ATC must notify the pilot of the expectation for a visual departure.

12.2.2 ATC Route Clearances

12.2.2.1 An ATC route clearance must include at least the first position at which the flight-planned route is joined.

12.2.2.2 Route clearances issued to aircraft operating VFR at night must be in accordance with the flight-planned route except:

(a) when the pilot specifically requests another route; or

(b) when an amended route is deemed satisfactory in relation to the planned route (e.g. coastline flying); or

(c) for short-term route variations:

(i) by vectoring; or

(ii) within 30 NM of a controlled aerodrome, by visual tracking.

12.2.2.3 Route clearances authorising RNAV tracking must only be permitted for flight segments contained within ATS surveillance system coverage unless:

(a) the route is published in AIP; or

(b) prior coordination has been conducted between affected units.

12.2.3 STAR Clearances

12.2.3.1 A STAR clearance must contain:

(a) STAR identifier;

(b) a TRANSITION route when applicable;

(c) a RUNWAY when applicable; and

(d) an instrument or visual termination procedure when applicable; and

(e) a LEVEL assignment.

12.2.3.2 Descent must be assigned in sufficient time to allow pilots to comply with vertical navigation requirements.

12.2.3.3 When an aircraft is vectored away from a Transition Route associated with a STAR, and the intention is that the aircraft will rejoin the Transition to complete the STAR procedure, ATC must re-state any restrictions/requirements applicable to the Transition Route. When an aircraft is vectored, the aircraft must be re-positioned to enable the Arrival Route to be flown and re-cleared.

12.2.4 Approach Clearances

12.2.4.1 A controller must not issue an air traffic clearance which authorises or requires a pilot to descend in IMC below the lowest safe altitude for the route segment in a manner different from that specified in:

(a) DME, DME or GPS, or GPS Arrival procedures;

(b) the procedures, plan and profile diagram of IAL charts published in AIP/FLIP Terminal;

(c) an approved instrument approach procedure published in NOTAM;

(d) approved ATS surveillance system procedures.

12.2.4.2 When a flight other than that described in paragraph 12.2.4.3 is within 30 NM of an aerodrome, a visual approach may be authorised by day or night to:

(a) a VFR flight; or

(b) an IFR flight when:

(i) the pilot has established and can continue flight to the aerodrome with continuous visual reference to the ground or water; and

(ii) the visibility along the flight path is not less than 5,000 M (or by day, the aerodrome is in sight).

12.2.4.3 In addition to the requirements of paragraph 12.2.4.2, with the exception of Australian and New Zealand operators and aircraft conducting independent visual approaches at Sydney, HEAVY jet aircraft may only be assigned a visual approach when:

(a) specifically requested by the pilot and the pilot has reported the landing runway is in sight; or

(b) the straight-in approach aid is unserviceable.

12.2.4.4 In the case of the straight-in approach aid being unserviceable, the aircraft must be:

(a) vectored to intercept final no closer than 8 NM from the runway threshold, at an altitude not less than 2,500 FT above aerodrome level (AAL); and

(b) assigned a straight-in visual approach when:

(i) established on final or on a heading to intercept final course at an angle of not more than 30 degrees;

(ii) visual glideslope guidance (VASIS/PAPI) is available; and

(iii) the pilot has reported the runway in sight.

12.2.4.5 When being vectored at night, an IFR aircraft, other than a HEAVY jet aircraft as described at paragraph 12.2.4.3, may be assigned a visual approach at any distance from an aerodrome, if:

(a) the aircraft has been assigned the minimum vector altitude; and

(b) the aircraft has been given heading instructions to intercept final or to position the aircraft within the circling area of the aerodrome; and

(c) the following phraseology is used to assign the visual approach:

(i) "WHEN ESTABLISHED ON THE VASIS/GLIDEPATH CLEARED VISUAL APPROACH"; or

(ii) "WHEN ESTABLISHED IN THE CIRCLING AREA CLEARED VISUAL APPROACH".

Section 12.3: Aerodrome Clearances

12.3.1 General

12.3.1.1 In addition to the provisions of ICAO PANS-ATM, Chapter 7.1, aerodrome controllers must issue information and clearances with the object of preventing collisions between aircraft and vehicles operating on the helicopter movement area, but excluding helicopter landing sites situated on apron areas or beyond the sight of the tower controller.

12.3.1.2 Whenever more than one runway is in use, the runway number must be included in the line up, take-off or landing clearance.

12.3.1.3 When issuing clearances or instructions, controllers must take into account the hazards that may be caused by thrust stream turbulence. When such hazards may not be obvious to other aircraft, vehicles and personnel, an appropriate caution must be issued.

12.3.2 Taxi and Pre-Taxi Instructions

12.3.2.1 A taxi instruction which contains a taxi limit beyond a runway must include a "CROSS RUNWAY (number)" instruction.

12.3.2.2 Aircraft required to hold short of a runway intersecting the taxi route, must be issued a taxi instruction limit of the holding point associated with the intersecting runway. Taxi instructions must not include a position beyond that of a required intermediate holding point.

12.3.2.3 Departing and arriving aircraft must be issued with an instructions to "CROSS RUNWAY (number)" if previously issued with:

(a) a taxi instruction limit of the holding point of a runway intersecting the taxi route; or

(b) an instruction to "HOLD SHORT" of a runway.

12.3.3 Line Up and Take-off Clearances

12.3.3.1 When aircraft are authorised to line up on the same or intersecting runways simultaneously, traffic information must be provided as appropriate.

12.3.3.2 An aircraft delayed by the traffic situation must be issued traffic information if appropriate, and instructed to hold position off the runway, or must be issued a conditional line-up clearance.

12.3.3.3 When an instruction to line up does not include a take-off clearance and is issued with the departure instructions, the appropriate holding instruction must be given.

12.3.3.4 The words “TAKE-OFF” must be used only for clearing an aircraft for take-off.

12.3.3.5 The words “TAKE-OFF” must be used as the last words of a take-off clearance, except when the following information must be appended:

(a) an instruction specifying a turn or circuit direction; or

(b) at a military airfield the state of the arrestor system;

12.3.3.6 In all other cases, the words “TAKE-OFF” must be used as the last words of the take- off clearance.

12.3.3.7 Unless requested, a take-off clearance must not be issued to a helicopter when the tailwind component exceeds 5 KT.

12.3.3.8 Within controlled airspace and at a controlled aerodrome, helicopters may be granted an airways and/or take-off clearance from any area which is nominated by ATC or the pilot, and assessed by the pilot as being suitable as a HLS.

12.3.3.9 Within a Class D CTR, a clearance to take-off is a clearance to operate within the CTR.

12.3.4 Landing Clearances

12.3.4.1 Clearance to land must not be issued before:

(a) the aircraft has commenced final approach of a PAR or straight in instrument approach; or

(b) the aircraft has been sighted by the tower controller:

(i) on the late downwind leg of the circuit pattern;

(ii) on base leg; or

(iii) on final in the case of a straight in visual approach.

12.3.4.2 Observation by radar satisfies the sighting requirement.

12.3.4.3 Unless requested by the pilot, a landing clearance must not be issued to a helicopter when the tailwind exceeds 5 KT.

12.3.4.4 When a tower controller has been advised that a general aviation aircraft with retractable undercarriage has experienced abnormal operations, a check gear down call must be made with the landing clearance.

12.3.4.5 A military aircraft must be instructed to check gear down when being cleared for an overshoot, cleared to land or cleared for a touch-and-go landing. Controllers must issue the instruction as soon as possible after a pilot indicates that his undercarriage is down and locked. Where a pilot neglects to declare his undercarriage status, the controller must instruct the pilot to check gear down.

12.3.4.6 If an arriving aircraft reports at a position where it should normally have been seen but has not been sighted, the aircraft must be advised of not being in sight by the controller when cleared to land.

12.3.4.7 Landing clearances must apply to aircraft which are restricted to the same or crossing landing paths. However, when such aircraft are permitted to land in parallel paths, clearances may be given for simultaneous landings. In these circumstances, notwithstanding that the pilot of each aircraft must be responsible for the maintenance of separation, the tower controller must issue alternative instructions should the possibility of a confliction arise.

12.3.4.8 The tower controller must allocate one landing sequence number to a landing formation, thus treating the formation as one aircraft.

12.3.4.9 When the landing area is occupied by another aircraft or is obstructed, arriving aircraft may be issued with a clearance to:

(a) continue approach if there is no immediate assurance that the landing areas will become available. This must be followed by the appropriate clearance; or

(b) go around, or orbit if in a position to do so, should the landing area not be available. When required, a clearance to commence a second approach or hold must follow these instructions. The nature of the obstruction must be advised if not apparent to the approaching aircraft.

CHAPTER 13: ABNORMAL OPERATIONS

Section 13.1: Weather Deviation and RVSM Contingency Procedures

13.1.1 Weather Deviation in Oceanic Airspace

13.1.1.1 In order to indicate priority, the pilot may initiate communication by stating "WEATHER DEVIATION REQUIRED". The pilot retains the option of initiating the communications using the urgency call "PAN PAN" three times to alert all listening parties of a special handling condition which will receive ATC priority for issuance of a clearance or assistance.

13.1.1.2 When a pilot requests clearance to deviate from track, the controller must:

(a) issue a clearance to deviate from track, if there is no conflicting traffic in the lateral dimension; or

(b) establish vertical separation and issue a clearance to deviate from track, if there is conflicting traffic in the lateral dimension; or

(c) if unable to establish vertical separation, and there is conflicting traffic in the lateral dimension;

(i) advise the pilot that clearance for the requested deviation is not available;

(ii) provide traffic about, and to, all affected aircraft; and

(iii) request pilot intentions.

Note Position may be expressed as direction and distance, or actual or estimated location or ATS route/ track code.

13.1.2 Aircraft Equipment Failures in RVSM Airspace

13.1.2.1 If a pilot of an RVSM approved aircraft operating in the RVSM flight level band advises "NEGATIVE RVSM", the controller must, as required:

(a) pass traffic information;

(b) obtain the pilot's intentions;

(c) provide alternative separation;

(d) update the FDR; and

(e) advise adjacent ATC facilities/sectors of the situation.

13.1.2.2 If a pilot advises that redundancy in primary altimetry systems is lost, but the remaining altimetry system is functioning normally, the controller should acknowledge the situation and continue to monitor the flight's progress.

Note: RVSM separation may still be applied in this instance.

Section 13.2: In Flight Emergency Response

13.2.1 Emergency Changes of Level

13.2.1.1 As an emergency measure, the use of flight levels separated by 500 FT (below FL290 or in RVSM airspace) or 1,000 FT (at or above FL290 in non-RVSM airspace) may be used temporarily when standard procedural separation cannot be applied provided that traffic information is issued.

13.2.1.2 If an emergency makes it necessary to clear all traffic from a particular area, ATC must broadcast the following message:

(a) "EMERGENCY TO ALL CONCERNED. EMERGENCY CLIMB/DESCENT AT… (location)." Then as required by circumstances;

(b) (for aircraft in holding pattern) "ALL AIRCRAFT ABOVE/BELOW ... (level) TURN RIGHT 90 DEGREES (for left hand holding pattern or left 90 degrees for right hand pattern)".

13.2.2 Fuel Dumping

13.2.2.1 Airspace affected by the fuel dumped from an aircraft in flight is known as the 'vapour zone' and is defined as that airspace at least 1,000 FT above, 2,000 FT below, 5 NM horizontally behind and ½ NM on each side of the aircraft.

13.2.2.2 In an emergency, or when fuel must be dumped without adequate warning or delay, controllers must make every effort to keep other aircraft clear of the 'vapour zone'. Additionally, ATS is responsible for:

(a) noting the area where jettison was affected;

(b) recording weather conditions and reporting the incident to the appropriate authority without delay.

13.2.2.3 In other than emergency circumstances ATS must specify which section of a nominated track may be used for the dumping of fuel and recommend that aircraft maintain a minimum height of 6,000 FT AGL. For safety reasons fuel is not to be dumped in a circular or race-track pattern.

13.2.2.4 For the purpose of providing separation, all the airspace containing the track specified, the selected altitude and a full allowance for the 'vapour zone' must be treated as reserved airspace from the time dumping is expected to commence until 5 MIN after it has been completed.

13.2.2.5 Known aircraft in Class G airspace likely to be affected are to be warned of the fuel dumping and the approximate location of the 'vapour zone'.

13.2.2.6 The warning must also be broadcast on the appropriate frequencies. Warnings are to continue during the period of fuel dumping and for 5 MIN after it has been completed.

CHAPTER 14: AERONAUTICAL COMMUNICATIONS

Section 14.1: General

14.1.1 Acknowledging Receipt of Verbal Coordination

14.1.1.1 When an ATS unit receives a verbal clearance or instruction from another ATS unit that includes any of the following, it must read back:

(a) any ATS route number or name;

(b) any tracking point;

(c) assigned level;

(d) any SID;

(e) any STAR identifier, including any runway specified;

(f) assigned SSR code;

(g) an assigned Mach No.;

(h) any heading, including direction of turn;

(i) any item notified in the clearance as “AMENDED” or “RECLEARED”;

(j) cancellation of a clearance;

(k) a level requirement/restriction;

(l) any clearance limit imposed;

(m) the word “VISUAL” when appended to level, heading, or turn instructions.

14.1.1.2 When an ATS unit receives a position report, a level check or a change of level from another ATS unit, the acknowledgment must include:

(a) the aircraft callsign;

(b) the advised level.

14.1.1.3 The originating unit must obtain a correct readback. Under no circumstances must receipt of a message be acknowledged by the callsign only of the acknowledging unit.

14.1.1.4 An acknowledgment must not be given until the receiving operator is satisfied that the transmitted information has been received correctly.

14.1.2 Telephony Protocols

14.1.2.1 The use of radiotelephony on aeronautical channels is to be in accordance with ICAO Annex 10, Vol. II, ICAO PANS-ATM and the Australian Aeronautical Information Publication (AIP). However, the AIP takes precedence in the event of any inconsistency.

14.1.3 Aeronautical Fixed Telecommunications Network

14.1.3.1 The use of the Aeronautical Fixed Telecommunication Network (AFTN) must be in accordance with the provisions of ICAO.

NOTES TO MANUAL OF STANDARDS PART 172

Note 1

The Manual of Standards Part 172 (in force under the *Civil Aviation Safety Regulations 1998*) as shown in this compilation comprises Manual of Standards Part 172 amended as indicated in the Tables below.

Table of Manual of Standards and Amendments

Year and number	Date of notification in *Gazette*/ registration on FRLI/FRL	Date of commencement	Application, saving or transitional provisions
MOS 172	1 May 2003	1 May 2003	—
MOS 172 2005 Amendment No. 1	FRLI 15 September 2005 (*see* F2005L02651)	16 September 2005 (*see* s. 2)	—
MOS 172 2006 Amendment No. 1	FRLI 28 March 2006 (*see* F2006L00929)	29 March 2006 (*see* s. 2)	—
MOS 172 2008 Amendment No. 1	FRLI 19 November 2008 (*see* F2008L04329)	20 November 2008 (*see* s. 2)	—
Manual of Standards Part 172 Amendment (No. 1) 2010	FRLI 31 May 2010 (*see* F2010L01259)	03 June 2010 (*see* s. 2)	—
Manual of Standards Part 172 Amendment (No. 1) 2011	FRLI 29 April 2011 (*see* F2011L00659)	s. 1, 2, 3 and 4, Schedule 1 (items 1-6, 8, 9) and Schedule 2: 30 April 2011 Schedule 1 (item 7): 02 June 2011	—
Manual of Standards Part 172 Amendment Instrument 2013 (No. 1)	FRLI 23 December 2013 (*see* F2013L02178)	01 January 2014 (*see* s. 2)	—
Manual of Standards Parts 139, 171, 172 and 173 Amendment Instrument 2016 (No. 1)	FRLI 13 January 2016 (*see* F2016L00042*)*	3 March 2016 (*see* s. 2)	—
Manual of Standards Part 172 Amendment Instrument 2019 (No. 1)	FRL 14 August 2019 (*see* F2019L01064)	15 August 2019 (*see* s. 2)	—
Part 172 (Air Traffic Service Providers) Amendment (Facilities & Equipment) Manual of Standards 2023	FRL 13 July 2023 (*see* F2023L01008)	14 July 2023 (*see* s. 2)	—

Year and number	Date of notification in *Gazette*/ registration on FRLI/FRL	Date of commencement	Application, saving or transitional provisions
Part 172 (Air Traffic Service Providers) Amendment (Fatigue Rules) Manual of Standards 2023	FRL 31 July 2023 (*see* F2023L01044)	1 August 2023 (*see* s. 2)	—

Revision History

Note: The Revision History shows the most recent amendment first. Scroll down the table to view details of previous amendment information.

Version	Date	Chapter Section Paragraph	Details
2.2	1 August 2023 Refer Part 172 (Air Traffic Service Providers) Amendment (Fatigue Rules) Manual of Standards 2023	Subsection 1.2.2, table	Added definitions for Fatigue and Fatigue risk management system, or FRMS
		After subsection 1.2.2.1	Inserted subsection 1.2.2.2
		After paragraph 2.1.2.1(o)	Inserted paragraph 2.1.2.1 (oa)
		At the end of subsection 2.1.2.1	Inserted a note
		Chapter 4	Substituted
		Paragraph 6.1.1.1(h)	Amended
		After paragraph 6.1.1.1(h)	Inserted paragraph 6.1.1.1(i)
		Subsection 6.1.1, note	Substituted
2.1	14 July 2023 Refer Part 172 (Air Traffic Service Providers) Amendment (Facilities & Equipment) Manual of Standards 2023	Chapter 3	Substituted

Version	Date	Chapter Section Paragraph	Details
2.0	27 February 2020 Refer subsections 10.4.9.2 and 10.5.5.3B of Manual of Standards Part 172 Amendment Instrument 2019 (No. 1)	Subsections 10.4.9, 10.5.5.3A and 10.5.5.3B	Omitted
1.9	15 August 2019 Refer Manual of Standards Part 172 Amendment Instrument 2019 (No. 1)	Subsection 10.4.9	Inserted after subsection 10.4.8
		Subsection 10.5.5.3	Substituted with new subsections 10.5.5.3, 10.5.5.3A, 10.5.5.3B and a Note
1.8	March 2016 Refer Manual of Standards Parts 139, 171, 172 and 173 Amendment Instrument 2016 (No. 1)	Subsection 10.3.1.1	Substituted
		Subsection 10.3.2.5	Amended
		Subsection 10.3.3, heading	Substituted
		Subsections 10.3.3.1 and 10.3.3.3	Substituted with new subsections 10.3.3.1, 10.3.3.2 and 10.3.3.3
		Subparagraph 10.3.4.3 (b) (ii)	Amended
		Paragraph 10.3.4.4 (b)	Amended
		Subsection 10.3.4.6	Substituted
		Subsection 10.3.5.2	Substituted
1.7	1 January 2014 (F2013L02178) Refer Amendment (No. 1) 2013	1.1.2.4	Substituted
		3.1.4.2	Substituted “that;” with “that:”
		9.1.6.1	Substituted
		9.1.6.1A	Inserted after 9.1.6.1
		10.2.1.1	Substituted
		10.2.5.1	Substituted
		10.2.5.2	Omitted
		10.2.9.2 (c)	Substituted
		10.2.9.2 (d)	Omitted
		10.2.12 and 10.2.13	Omitted
		10.4.2.1	Substituted

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1.7 contd		10.5.5.1 and 10.5.5.2	Substituted
		10.5.5.2A	Inserted after 10.5.5.2
		10.6.4	Substituted “EGAVI” with “UPNOT”
		10.7.11	Substituted “Aircraft with RVSM approval, except military formation flights operating in airspace in which a Class A service is being provided” with “Aircraft with RVSM approval, excluding military formation flights”
		10.8.3.8, Table 10.8-3	Inserted a new row pertaining to “Localiser Equivalence” at the end of the table
		10.11.1.3	Omitted
		10.2.1	Substituted the text under the subsection title
		10.12,2,1	Substituted “Full Length operations” with “Full length or crossing runway operations, or crossing flight paths”
		10.12.2.1	Substituted original diagram with two diagrams
		10.12.3.1 (b)	Substituted “not more” with “less”
		10.12.3.4	Substituted
		10.13.2.3	Substituted
		10.13.2.4	Substituted
		10.13.2.6	Substituted “When TAR” with “For subsections 10.13.2.3 and 10.13.2.4, when an ATS surveillance system suitable for 3 NM separation”
		10.13.8	Substituted table row “Take-off Helicopter” with two table rows “Take-off behind a previous departing helicopter” and “Helicopter taking-off behind a preceding departing aircraft”
1.6	June 2011 Refer Amendment (No. 1) 2011 Schedule 1 and Schedule 2	Chapter 1	After subsection 1.1.6. insert heading “Section 1.2: Abbreviations and Definitions”
		1.1.1.7 (table)	Inserted abbreviation for “positive radio fix”
		1.1	Renumbered 1.1.7 as 1.2.1, and 1.1.7.1 as 1.2.1.1.
		Chapter 1	Substituted heading “1.2.1: Introduction” with “1.2.2: Definitions”
		1.2.2	Renumbered 1.2.1.1 as 1.2.2.1.
		10.3	After subsection 10.3.2, inserted new subsections 10.3.3 (Implementation of low visibility operations; 10.3.4 (Protecting ILS critical and sensitive areas); and 10.3.5 (Informing pilots when critical and sensitive areas are not protected)
		10.8.2.2 (e) (i)	Omitted “PRF” and inserted “positive radio fix”

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1.6 contd.		10.3.2	Confirmed the following provision numbers: 10.3.2.1, 10.3.2.2, 10.3.2.3, 10.3.2.4, and 10.3.2.5
		10.6.9	Confirmed provision number 10.6.9.4
		10.13	Confirmed provision number 10.13.8
		11.1	Confirmed the following provision numbers: 11.1.1, 11.1.1.1, 11.1.1.2, 11.1.1.3, 11.1.4.3, 11.1.4.4, 11.1.4.5, 11.1.4.6, 11.1.2, 11.1.2.1, 11.1.2.2, 11.1.3, 11.1.3.1, 11.1.3.2, 11.1.4, 11.1.4.1, and 11.1.4.2.
1.5	May 2010 Refer Amend-ment (No. 1) 2010	1.1.7	New abbreviations added
		1.2.1.1	New definition added
		10.1	New subsections 10.1.4 and 10.1.5 added
		10.3.2.1	Omitted
		10.3.2.2	Substituted
		10.3	New paragraphs 10.3.2.5 and 10.3.2.6 added
		10.4	New paragraph 10.5.4.7 added
		10.4.6	The table, Minima for T7c, Second condition: text substituted
		10.6.10.2	Substituted
		10.10.1.3	Substituted
		10.12.1	Substituted
		10.12.2	Substituted
		10.12.3.1	Substituted
		10.12.3.2	All words before paragraph (a) substituted
		10.12.3.3	Substituted
		10.12.3.4	Substituted
		10.12.3.5	Substituted
		10.12.3.7	Substituted
		10.13.8	Omitted
		10.13.9	Last table row substituted
		11.1.1	Omitted
		11.1.2.3	Substituted
		11.1.5.5	Substituted
		11.1.5.6	Substituted
		12.1.2	New paragraph 12.1.2.3 added
		12.1	New subsection 12.1.8 added
		12.3.3	New paragraph 12.3.3.9 added

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1.5 contd		12.4	Omitted
		12.5	Omitted
		12.6	Omitted
1.4	November 2008	10.6.9.2 (c)	Paragraph (c) substituted and paragraphs (d) and (e) added
		10.6.9.4	Omitted
		10.6.9.6	Omitted
		10.8.3.9	Substituted
		10.9.2.1	Omitted
1.3	April 2006 Refer Amendment No. 1 – 2006, 21 Mar 2006 Schedule 1 and Schedule 2	1.1.7.1	New abbreviations added
		1.2.1.1	New definitions added
		10.2	Heading changed
		10.2.1 and 10.2.1.1	New section substituted
		10.2.2 and subsection	Moved to 10.2.7 and new Section 10.2.2 inserted
		10.2.3 and subsection	Heading changed and moved to 10.2.8 and new Section 10.2.3 inserted
		10.2.4 and subsections	New text substituted, moved to 10.2.9 and new Section 10.2.4 inserted
		10.2.5 and subsection	New text substituted, moved to 10.2.10 and new Section 10.2.5 inserted
		10.2.6 and subsections	New text substituted, moved to 10.2.11 and new Section 10.2.6 inserted
		10.2.7 and subsection	Moved to 10.2.12 and new Section 10.2.7 inserted
		10.2.8 and subsections	Moved to 10.2.13 and new Section 10.2.8 inserted
		10.4.1.2	New text substituted
		10.5.4.3	“radar” omitted
		10.5.4.4	New text substituted
		10.5.4.5	New text substituted
		10.5.4.6	“radar standard” substituted with “ATS surveillance system separation minimum”
		10.5.5	Heading changed
		10.5.5.1(b)(ii)	“displays” replaced with “displays, and”
		10.5.5.1(b)	New paragraph inserted and rest renumbered
		10.5.5.4	New text substituted
		10.5.5.5	New text substituted
		10.5.5.6	New text substituted

1.3 contd.		In table 10.6.4 text	Following replaced as shown: “radar” “ATS surveillance system” “Radar observation: replaced with “ATS surveillance system observation” ”5-minute” replaced with “5 min” ”One aircraft” replaced with “1 aircraft”
		In table 10.6.4 diagrams	“PRF/ATC Radar Posn” replaced with ”PRF/Posn (see text)”
		10.6.7.9	New text substituted
		10.6.7.10	New text substituted
		10.6.10.2	New text substituted
		10.6.10.4	New text substituted
		Table 10.6.11	New sections substituted
		10.8.2.1	New text substituted
		10.8.2.2	New text substituted
		10.8.3.11	New text substituted
		Table 10.8.6	New table substituted
		10.12.3.6(c)	New text substituted
		10.12.3.7	“radar” replaced with “ATS surveillance system”
		10.13.2.4	“radar” replaced with “ATS surveillance system”
		10.13.2.5	“radar” replaced with “ATS surveillance system”
		11.1.5.1	“radar” replaced with “ATS surveillance”
		11.1.5.2	“Mode C” replaced with “pressure altitude derived”
		12.1.7	New section inserted
		12.2.2.2(c)(i)	“radar” deleted
		12.2.2.3	“radar” replaced with “ATS surveillance system”
		12.2.3.3	“radar” deleted
		12.2.4.1(d)	“radar” replaced with “ATS surveillance system”
		12.2.4.4	“radar” deleted
		12.2.4.5	New text substituted
		14.1.1.1(d)	“or SID radar” deleted
1.2	September 2005 Refer Amendment No. 1 – 2005, 12 Sept 2005 Schedule 1 and Schedule 2	1.1.1.1	New text substituted
		1.1.2.1 and 1.1.2.2	New text substituted
		1.1.2.4	Second para changed
		1.1.5	Entire section replaced
		1.2.1	New section added
		6.1.1 and 6.1.2	New text substituted
		10.5	Title changed
		10.5.5.1 to 10.5.5.2	New text substituted
		10.5.6	New section added
		10.6.4	Table replaced
		10.6.7.4	New text substituted
1.2 contd.		10.6.7.6	New section inserted and subsequent sections renumbered
		10.6.9.2 and 10.6.9.3	New text substituted

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		10.6.10	New text substituted
		10.6.11, 10.6.12	Tables replaced
		10.6.13	Table replaced
		10.7.1.2	New text substituted
		10.7.7	New section inserted and subsequent sections renumbered
		10.7.11	Table replaced
		10.8.2.3	New text substituted
		10.9.4.2	References 10.6.11 and 10.6.13 removed
		10.10.2.3	New text substituted
		10.12.2	New text and tables substituted
		10.12.3.1 to 10.12.3.3	New text substituted
		10.13.4.1	New text substituted
		10.13.5.3 and 10.13.5.4	New text substituted
		10.13.8.3	New text substituted
		10.13.9	Table replaced
		11.1.5.3 to 11.1.5.6	New text added
		12.2.4.5	New text substituted
		12.6.1.1	New text substituted
		12.6.1.6	Removed
		13.1 and 13.1.1	Titles changed
		13.1.1.3	Para 13.1.1.3 replaced by Note
1.1	March 2003	1.1.1.1 1.1.2.4 and 1.1.6.1 1.1.4.1 1.1.5.4 1.1.5.5	‘CASR’ inserted Major changes to Paragraphs ‘Gen 1.7’ replaced by ‘Supplement’ Minor text changes. New paragraph added.
		2.1.2.1 (l) (iii) 2.1.2.1 (j)	Minor text change ‘and hours of operation’ deleted
		3.1.2.1 (a) 3.1.2.1 (d) (iii)	Minor text changes.
		5.1.2.1	Minor change
		9.1.3.1 (a), (b), (c) 9.1.3.3 9.1.4.5	Reference to ICAO deleted. 90 days changed to 30 days Major change

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1.1 contd		10.1.1.1 10.1.4 10.2.4.1 10.3.2 10.4.8.1 (b) 10.6.5.3 10.6.11, Row R3, subpara 3 10.8.4 10.11.1.2 10.11.6	Changes to text Deleted Changes to text Of version 1.0 deleted (subsequent paragraphs renumbered) New text added Text inserted Text added to 'Condition' column in table Entire paragraph deleted Text added New paragraph inserted (subsequent paragraphs renumbered)
		11.1.2.1	Changed.
		12.2.3.4 12.2.4.2 Section 12.4 and Section 12.5	Paragraphs deleted (subsequent paragraphs renumbered) Two new sections added: Previous Section 12.4 renumbered as Section 12.6.
		14.1.1.1	Changed
1.0	June 2002	All	First issue of MOS Part 172