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AMENDMENT NO. 9
TO THE
PROCEDURES
FOR
AIR NAVIGATION SERVICES

AIR TRAFFIC MANAGEMENT

SIXTEENTH EDITION — 2016

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments
to the PANS-ATM (Doc 4444), Sixteenth Edition

Date of applicability

Sixteenth Edition

Amendment No. 7-A

(Approved by the President of the Council of ICAO
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Amendment No. 9

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Replacement pages (v), (vi), (vii), (viii), (xviii), (xix), 1-16, 1-17, 1-18,
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8-22A, 8-22B, 10-2, 11-27, 11-28, 12-10, 12-11, 12-11A, 12-11B,
12-21, 15-5, 15-6, 15-7, 15-8, 15-8A, 15-8B, 15-8C, 15-8D, 16-6,
16-7, A1-2, A1-4, A1-5, A1-6, A1-7, A1-8, A2-5, A2-23 and A3-11.



Transmittal note

Amendment No. 9
to the
Procedures for Air Navigation Services
AIR TRAFFIC MANAGEMENT
(Doc 4444)

1. Insert the following new and replacement pages in the PANS-ATM (Sixteenth Edition) to incorporate Amendment No. 9 which becomes applicable on 5 November 2020.

- | | |
|--|---------------------|
| a) Pages (v) to (viii) | — Table of Contents |
| b) Pages (xviii) and (xix) | — Foreword |
| c) Pages 1-16 to 1-18 | — Chapter 1 |
| d) Pages 2-1, 2-4 and 2-5 | — Chapter 2 |
| e) Pages 4-12 to 4-24 | — Chapter 4 |
| f) Pages 5-10, 5-24, 5-27, 5-30, 5-31, 5-34, 5-35, 5-40 and 5-43 to 5-53 | — Chapter 5 |
| g) Pages 6-16, 6-18 and 6-21 | — Chapter 6 |
| h) Pages 7-3, 7-7, 7-13, 7-15 and 7-16 | — Chapter 7 |
| i) Pages 8-16 and 8-18 to 8-22B | — Chapter 8 |
| j) Page 10-2 | — Chapter 10 |
| k) Pages 11-27 and 11-28 | — Chapter 11 |
| l) Pages 12-10 to 12-11B and 12-21 | — Chapter 12 |
| m) Pages 15-5 to 15-8D | — Chapter 15 |
| n) Pages 16-6 and 16-7 | — Chapter 16 |

- o) Pages A1-2 and A1-4 to A1-8 — Appendix 1
- p) Pages A2-5 and A2-23 — Appendix 2
- q) Page A3-11 — Appendix 3

2. Record the entry of this amendment on page (iii).

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<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Approved Applicable</i>
2	Separation and Airspace Safety Panel; and Secretariat and the Proficiency Requirements in Common English Study Group	Tolerance values to be used by controllers for verification of the accuracy of the level information reported by Mode C; language proficiency requirements; and editorial amendment to Appendix 1.	26 March 2003 27 November 2003
3	Secretariat/Air Navigation Commission; Meteorology Divisional Meeting (2002); Recommendation 3/3 of the fourth meeting of the Global Navigation Satellite System Panel (GNSSP/4).	Runway incursions; phraseologies concerning 8.33 kHz channel spacing, RVSM and GNSS; special air-reports and other meteorological information; and amendment of definitions.	29 June 2004 25 November 2004
4	Secretariat	Definitions; meteorological information; special procedures for in-flight contingencies in oceanic airspace; reduced runway separation minima; air-ground communications failure procedures; phraseologies for use on and in the vicinity of the aerodrome.	31 March 2005 24 November 2005
15th Edition	Secretariat/Air Navigation Commission; Separation and Airspace Safety Panel (SASP); Operational Data Link Panel (OPLINKP); Surveillance and Conflict Resolution Systems Panel (SCRSP); Operations Panel (OPSP); International Airways Volcano Watch Operations Group (IAVWOPSG)	Definitions; procedures for ADS-B, ADS-C, AIDC, CPDLC and RCP; pilot procedures in the event of unlawful interference; coordination procedures between ATS and other entities; name-code designators; criteria for the selection of preferential runways; procedures and phraseologies relating to ACAS; procedures related to volcanic ash.	1 June 2007 22 November 2007
1	Flight Plan Study Group (FPLSG)	Update the ICAO model flight plan form.	27 May 2008 15 November 2012
2	Secretariat/Instrument Flight Procedures Panel first working group of the whole meeting (IFPP-WG/WHL/1)	Definitions; horizontal speed control instructions; procedures for arriving aircraft; runway incursion and reporting; phraseologies for use on the aerodrome; special procedures for in-flight contingencies in Oceanic airspace; short-term conflict alert procedures (STCA); strategic lateral offset procedures (SLOP); notification of suspected communicable diseases on board an aircraft.	26 June 2009 19 November 2009
3	Secretariat; Separation and Airspace Safety Panel (SASP); Meteorological Information Data Link Study Group (METLINKSG); International Airways Volcano Watch Operations Group (IAVWOPSG)	Amendment to definitions; aircraft separation minima; lateral separation of aircraft in terminal areas; and air-reporting.	12 October 2010 18 November 2010
4	Secretariat; Separation and Airspace Safety Panel (SASP); Operations Panel (OPSP) Twelfth Working Group of the Whole Meeting (WG/WHL/12); and Air Navigation Commission	Amendment to the foreword; definitions; separation minimum using ADS-B and/or multilateration systems; and provisions for phraseology and air traffic control (ATC) procedures related to fuel aligned with Annex 6 requirements.	16 March 2012 15 November 2012

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Approved Applicable</i>
5	Secretariat supported by the Approach Classification Task Force (ACTF) in coordination with the Aerodromes Panel (AP), the Instrument Flight Procedures Panel (IFPP), the Navigation Systems Panel (NSP) and the Operations Panel (OPSP)	Amendment concerning definitions related to instrument approach operations and procedures as a result of the new approach classification.	20 March 2013 13 November 2014
6	Secretariat; Separation and Airspace Safety Panel (SASP); International Volcanic Ash Task Force (IVATF); Operational Data Link Panel (OPLINKP); and Aerodrome Panel (AP)	Amendment to definitions; controller pilot data link communication (CPDLC) procedures; in-trail procedure (ITP); automatic dependent surveillance — contract (ADS-C) procedures; volcanic ash cloud, strategic lateral offset procedures (SLOP); 9.3 km (5 NM) terminal separation based on RNP, PBN lateral separation and VOR/GNSS lateral separation and consequential ATC phraseologies.	20 June 2014 13 November 2014
7-A (16th edition)	The Separation and Airspace Safety Panel (SASP), the second meeting of the Operational Data Link Panel (OPLINKP/2), the third meeting of the Air Traffic Management Operations Panel (ATMOPSP/3) and the Secretariat, the first meeting of the Flight Operations Panel (FTOPSP/1), the sixteenth meeting of the Operations Panel Working Group of the Whole (OPSP/WG/WHL/16), the third meeting of the Aerodromes Panel (AP/3) and the Meteorology (MET) Divisional Meeting (2014).	Performance-based longitudinal and lateral separation minima and ADS-C CDP; separation between arrival and departure operations; DLIC, CPDLC, ADS-C, PBCS and SATVOICE; procedures used to vector for final approach, advising of TORA and SID/STAR; standard phraseology for ground and flight de/anti-icing crews; emergency descent procedures; autonomous runway incursion warning system (ARIWS); and forwarding of special air-reports and definition of SIGMET information.	6 June 2016 10 November 2016
7-B	The third meeting of the Aerodromes Panel (AP/3)	The use of a global reporting format for assessing and reporting runway surface conditions.	6 June 2016 5 November 2020
8	The first meeting of the Separation and Airspace Safety Panel (SASP/1), the fourth meeting of the Air Traffic Management Operations Panel (ATMOPSP/4) and the Secretariat, the third meeting of the Flight Operations Panel (FTOPSP/3), the thirteenth meeting of the Instrument Flight Procedures Panel (IFPP/13), the twelfth meeting of the Aeronautical Information Service (AIS) Aeronautical Information Management (AIM) Study Group (AIS-AIMSG/12) and the second meeting of the Meteorology Panel (METP/2).	Lateral separation and parallel operations, remote ATS and ATM procedures, the restructuring of PANS-OPS, Volume I, Parts I and II (Phase II), the restructuring of Annex 15 and incorporation of AIM concepts, the transmission of space weather information as part of a flight information service.	6 August 2018 8 November 2018

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Approved Applicable</i>
9	The second meeting of the Separation and Airspace Safety Panel (SASP/2), the tenth meeting of the Wake Turbulence Specific Working Group (WTSWG/10) and the fourth meeting of the Meteorology Panel (METP/4).	Reduced lateral and longitudinal performance based separation minima, reduced wake turbulence separation minima, ATS surveillance separating minima where VHF is not available, special procedures for in-flight contingencies in oceanic airspace, strategic lateral offset procedures (SLOP), alignment of reporting of heavy dust and sand storms with Annex 3, and alignment with Annex 19 terminology for safety risk assessment.	19 May 2020 5 November 2020

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— *Navigation performance and requirements are defined for a particular RNP type and/or application.*

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Rescue unit. A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway-holding position. A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

Note.— *In radiotelephony phraseologies, the expression “holding point” is used to designate the runway-holding position.*

Runway incursion. Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Safety management system (SMS). A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

Secondary radar. A radar system wherein a radio signal transmitted from the radar station initiates the transmission of a radio signal from another station.

Secondary surveillance radar (SSR). A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

Segregated parallel operations. Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

Sending unit/controller. Air traffic services unit/air traffic controller transmitting a message.

Note.— *See definition of “receiving unit/controller”.*

Shoreline. A line following the general contour of the shore, except that in cases of inlets or bays less than 30 nautical miles in width, the line shall pass directly across the inlet or bay to intersect the general contour on the opposite side.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations.

Significant point. A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

Note.— There are three categories of significant points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids.

Situation display. An electronic display depicting the position and movement of aircraft and other information as required.

Special VFR flight. A VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC.

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.

Standard instrument arrival (STAR). A designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

Standard instrument departure (SID). A designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the en-route phase of a flight commences.

Standard message element. Part of a message defined in the PANS-ATM (Doc 4444) in terms of display format, intended use and attributes.

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

Surveillance radar. Radar equipment used to determine the position of an aircraft in range and azimuth.

Taxiing. Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Taxiway. A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

- a) *Aircraft stand taxilane.* A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
- b) *Apron taxiway.* A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
- c) *Rapid exit taxiway.* A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

Terminal control area (TMA). A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Threshold. The beginning of that portion of the runway usable for landing.

Time difference of arrival (TDOA). The difference in relative time that a transponder signal from the same aircraft (or ground vehicle) is received at different receivers.

Total estimated elapsed time. For IFR flights, the estimated time required from take-off to arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the destination aerodrome, to arrive over the destination aerodrome. For VFR flights, the estimated time required from take-off to arrive over the destination aerodrome.

Touchdown. The point where the nominal glide path intercepts the runway.

Note.— “Touchdown” as defined above is only a datum and is not necessarily the actual point at which the aircraft will touch the runway.

Track. The projection on the earth’s surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Traffic avoidance advice. Advice provided by an air traffic services unit specifying manoeuvres to assist a pilot to avoid a collision.

Traffic information. Information issued by an air traffic services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.

Transfer of control point. A defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or control position to the next.

Transferring unit/controller. Air traffic control unit/air traffic controller in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit/air traffic controller along the route of flight.

Note.— See definition of “accepting unit/controller”.

Transition altitude. The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Transition layer. The airspace between the transition altitude and the transition level.

Transition level. The lowest flight level available for use above the transition altitude.

Uncertainty phase. A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

Unmanned free balloon. A non-power-driven, unmanned, lighter-than-air aircraft in free flight.

Note.— Unmanned free balloons are classified as heavy, medium or light in accordance with specifications contained in Annex 2, Appendix 5.

Vectoring. Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.

VFR. The symbol used to designate the visual flight rules.

VFR flight. A flight conducted in accordance with the visual flight rules.

Visibility. Visibility for aeronautical purposes is the greater of:

- a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;
- b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note 1.— The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Note 2.— The definition applies to the observations of visibility in local routine and special reports, to the observations of prevailing and minimum visibility reported in METAR and SPECI and to the observations of ground visibility.

Visual approach. An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

Visual meteorological conditions. Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Note.— The specified minima are contained in Annex 2, Chapter 4.

Visual surveillance system. An electro-optical system providing an electronic visual presentation of traffic and any other information necessary to maintain situational awareness at an aerodrome and its vicinity.

VMC. The symbol used to designate visual meteorological conditions.

Waypoint. A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or

Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

Chapter 2

ATS SAFETY MANAGEMENT

2.1 GENERAL

2.1.1 States shall ensure that the level of air traffic services (ATS) and communications, navigation and surveillance, as well as the ATS procedures applicable to the airspace or aerodrome concerned, are appropriate and adequate for maintaining an acceptable level of safety in the provision of ATS.

2.1.2 The requirements in respect of services, systems and procedures applicable to airspaces and aerodromes should be established on the basis of a regional air navigation agreement in order to facilitate the harmonization of ATS in adjacent airspaces.

2.1.3 To ensure that safety in the provision of ATS is maintained, the appropriate ATS authority shall implement safety management systems (SMS) for the air traffic services under its jurisdiction. Where appropriate, ATS SMS should be established on the basis of a regional air navigation agreement.

2.2 OBJECTIVES

The objectives of ATS safety management are to ensure that:

- a) the established level of safety applicable to the provision of ATS within an airspace or at an aerodrome is met; and
- b) safety-related enhancements are implemented whenever necessary.

2.3 ATS SAFETY MANAGEMENT ACTIVITIES

2.3.1 An ATS SMS should include, *inter alia*, the following with respect to the provision of air traffic services:

- a) monitoring of overall safety levels and detection of any adverse trend;
- b) safety reviews of ATS units;
- c) safety risk assessments in respect of the planned implementation of airspace reorganizations, the introduction of new equipment systems or facilities, and new or changed ATS procedures; and
- d) a mechanism for identifying the need for safety enhancing measures.

2.3.2 All activities undertaken in an ATS SMS shall be fully documented. All documentation shall be retained for such period of time as is specified by the appropriate authority.

2.4 MONITORING OF SAFETY LEVELS

2.4.1 Collection and evaluation of safety-related data

2.4.1.1 Data for use in safety monitoring programmes should be collected from as wide a range of sources as possible, as the safety-related consequences of particular procedures or systems may not be realized until after an incident has occurred.

2.4.1.2 The appropriate ATS authority should establish a formal incident reporting system for ATS personnel to facilitate the collection of information on actual or potential safety hazards or deficiencies related to the provision of ATS, including route structures, procedures, communications, navigation and surveillance systems and other safety significant systems and equipment as well as controller workloads.

Note.— Guidance related to both mandatory and voluntary State incident reporting systems is contained in the Safety Management Manual (SMM) (Doc 9859).

2.4.2 Review of incident and other safety-related reports

2.4.2.1 Safety-related reports concerning the operation of air traffic services, including air traffic incident reports, shall be systematically reviewed by the appropriate ATS authority in order to detect any adverse trend in the number and types of incidents which occur.

2.4.2.2 Reports concerning the serviceability of ATS facilities and systems, such as failures and degradations of communications, surveillance and other safety significant systems and equipment, shall be systematically reviewed by the appropriate ATS authority in order to detect any trend in the operation of such systems which may have an adverse effect on safety.

2.5 SAFETY REVIEWS

2.5.1 General requirements

Safety reviews of ATS units shall be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having a full understanding of relevant Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS), safe operating practices and Human Factors principles.

2.5.2 Scope

The scope of ATS unit safety reviews should include at least the following issues:

Regulatory issues to ensure that:

- a) ATS operations manuals, ATS unit instructions and air traffic control (ATC) coordination procedures are complete, concise and up-to-date;
- b) the ATS route structure, where applicable, provides for:
 - 1) adequate route spacing; and

- 2) crossing points for ATS routes located so as to reduce the need for controller intervention and for inter- and intra-unit coordination;
- c) the separation minima used in the airspace or at the aerodrome are appropriate and all the provisions applicable to those minima are being complied with;
- d) where applicable, provision is made for adequate observation of the manoeuvring area, and procedures and measures aimed at minimizing the potential for inadvertent runway incursions are in place. This observation may be performed visually or by means of an ATS surveillance system;
- e) appropriate procedures for low visibility aerodrome operations are in place;
- f) traffic volumes and associated controller workloads do not exceed defined, safe levels and that procedures are in place for regulating traffic volumes whenever necessary;
- g) procedures to be applied in the event of failures or degradations of ATS systems, including communications, navigation and surveillance systems, are practicable and will provide for an acceptable level of safety; and
- h) procedures for the reporting of incidents and other safety-related occurrences are implemented, that the reporting of incidents is encouraged and that such reports are reviewed to identify the need for any remedial action.

Operational and technical issues to ensure that:

- a) the environmental working conditions meet established levels for temperature, humidity, ventilation, noise and ambient lighting, and do not adversely affect controller performance;
- b) automation systems generate and display flight plan, control and coordination data in a timely, accurate and easily recognizable manner and in accordance with Human Factors principles;
- c) equipment, including input/output devices for automation systems, are designed and positioned in the working position in accordance with ergonomic principles;
- d) communications, navigation, surveillance and other safety significant systems and equipment:
 - 1) are tested for normal operations on a routine basis;
 - 2) meet the required level of reliability and availability as defined by the appropriate authority;
 - 3) provide for the timely and appropriate detection and warning of system failures and degradations;
 - 4) include documentation on the consequences of system, subsystem and equipment failures and degradations;
 - 5) include measures to control the probability of failures and degradations; and
 - 6) include adequate backup facilities and/or procedures in the event of a system failure or degradation; and
- e) detailed records of systems and equipment serviceability are kept and periodically reviewed.

Note.— *In the context above, the terms reliability and availability have the following meanings:*

- 1) *Reliability. The probability that a device or system will function without failure over a specified time period or amount of usage; and*
- 2) *Availability. The ratio of percentage of the time that a system is operating correctly to the total time in that period.*

Licensing and training issues to ensure that:

- a) controllers are adequately trained and properly licensed with valid ratings;
- b) controller competency is maintained by adequate and appropriate refresher training, including the handling of aircraft emergencies and operations under conditions with failed and degraded facilities and systems;
- c) controllers, where the ATC unit/control sector is staffed by teams, are provided relevant and adequate training in order to ensure efficient teamwork;
- d) the implementation of new or amended procedures, and new or updated communications, surveillance and other safety significant systems and equipment is preceded by appropriate training and instruction;
- e) controller competency in the English language is satisfactory in relation to providing ATS to international air traffic; and
- f) standard phraseology is used.

2.6 SAFETY RISK ASSESSMENTS

2.6.1 Need for safety risk assessments

2.6.1.1 A safety risk assessment shall be carried out in respect of proposals for significant airspace reorganizations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the introduction of new equipment, systems or facilities, such as:

- a) a reduced separation minimum to be applied within an airspace or at an aerodrome;
- b) a new operating procedure, including departure and arrival procedures, to be applied within an airspace or at an aerodrome;
- c) a reorganization of the ATS route structure;
- d) a resectorization of an airspace;
- e) physical changes to the layout of runways and/or taxiways at an aerodrome; and
- f) implementation of new communications, surveillance or other safety-significant systems and equipment, including those providing new functionality and/or capabilities.

Note 1.— A reduced separation minimum may refer to the reduction of a horizontal separation minimum, including a minimum based on required navigation performance (RNP), a reduced vertical separation minimum of 300 m (1 000 ft) between FL 290 and FL 410 inclusive (RVSM), the reduction of a separation minimum based on the use of an ATS surveillance system or a wake turbulence separation minimum or reduction of minima between landing and/or departing aircraft.

Note 2.— When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety risk assessments may rely on operational judgement.

2.6.1.2 Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

2.6.2 Safety-significant factors

The safety risk assessment shall consider relevant all factors determined to be safety-significant, including:

- a) types of aircraft and their performance characteristics, including aircraft navigation capabilities and navigation performance;
- b) traffic density and distribution;
- c) airspace complexity, ATS route structure and classification of the airspace;
- d) aerodrome layout, including runway configurations, runway lengths and taxiway configurations;
- e) type of air-ground communications and time parameters for communication dialogues, including controller intervention capability;
- f) type and capabilities of surveillance system, and the availability of systems providing controller support and alert functions. Where ADS-B implementation envisages reliance upon a common source for surveillance and/or navigation, the safety risk assessment shall take account of adequate contingency measures to mitigate the risk of either degradation or loss of this common source (i.e. common mode failure); and
- g) any significant local or regional weather phenomena.

Note 1.— See also Chapter 5, Section 5.11, concerning reductions in separation minima.

Note 2.— Guidance material on methods of expressing and assessing a safety level and on safety monitoring programmes is contained in Annex 11, Attachment B, the Air Traffic Services Planning Manual (Doc 9426), the Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574), the Performance-based Navigation (PBN) Manual (Doc 9613) and the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

2.7 SAFETY-ENHANCING MEASURES

2.7.1 Any actual or potential hazard related to the provision of ATS within an airspace or at an aerodrome, whether identified through an ATS safety management activity or by any other means, shall be assessed and classified by the appropriate ATS authority for its risk acceptability.

2.7.2 Except when the risk can be classified as acceptable, the ATS authority concerned shall, as a matter of priority and as far as practicable, implement appropriate measures to eliminate the risk or reduce the risk to a level that is acceptable.

2.7.3 If it becomes apparent that the level of safety applicable to an airspace or an aerodrome is not, or may not be achieved, the appropriate ATS authority shall, as a matter of priority and as far as practicable, implement appropriate remedial measures.

2.7.4 Implementation of any remedial measure shall be followed by an evaluation of the effectiveness of the measure in eliminating or mitigating a risk.

4.7.1.2 Vertical speed adjustments should be limited to those necessary to establish and/or maintain a desired separation minimum. Instructions involving frequent changes of climb/descent rates should be avoided.

4.7.1.3 The flight crew shall inform the ATC unit concerned if unable, at any time, to comply with a specified rate of climb or descent. In such cases, the controller shall apply an alternative method to achieve an appropriate separation minimum between aircraft, without delay.

4.7.1.4 Aircraft shall be advised when a rate of climb/descent restriction is no longer required.

4.7.2 Methods of application

4.7.2.1 An aircraft may be instructed to expedite climb or descent as appropriate to or through a specified level, or may be instructed to reduce its rate of climb or rate of descent.

4.7.2.2 Climbing aircraft may be instructed to maintain a specified rate of climb, a rate of climb equal to or greater than a specified value or a rate of climb equal to or less than a specified value.

4.7.2.3 Descending aircraft may be instructed to maintain a specified rate of descent, a rate of descent equal to or greater than a specified value or a rate of descent equal to or less than a specified value.

4.7.2.4 In applying vertical speed control, the controller should ascertain to which level(s) climbing aircraft can sustain a specified rate of climb or, in the case of descending aircraft, the specified rate of descent which can be sustained, and shall ensure that alternative methods of maintaining separation can be applied in a timely manner, if required.

Note.— Controllers need to be aware of aircraft performance characteristics and limitations in relation to a simultaneous application of horizontal and vertical speed limitations.

4.8 CHANGE FROM IFR TO VFR FLIGHT

4.8.1 Change from instrument flight rules (IFR) flight to visual flight rules (VFR) flight is only acceptable when a message initiated by the pilot-in-command containing the specific expression “CANCELLING MY IFR FLIGHT”, together with the changes, if any, to be made to the current flight plan, is received by an air traffic services unit. No invitation to change from IFR flight to VFR flight is to be made either directly or by inference.

4.8.2 No reply, other than the acknowledgment “IFR FLIGHT CANCELLED AT ... (time)”, should normally be made by an air traffic services unit.

4.8.3 When an ATS unit is in possession of information that instrument meteorological conditions are likely to be encountered along the route of flight, a pilot changing from IFR flight to VFR flight should, if practicable, be so advised.

Note.— See Chapter 11, 11.4.3.2.1.

4.8.4 An ATC unit receiving notification of an aircraft’s intention to change from IFR to VFR flight shall, as soon as practicable thereafter, so inform all other ATS units to whom the IFR flight plan was addressed, except those units through whose regions or areas the flight has already passed.

4.9 WAKE TURBULENCE

Note.— The term “wake turbulence” is used in this context to describe the effect of the rotating air masses generated behind the wing tips of aircraft, in preference to the term “wake vortex” which describes the nature of the air masses. Detailed characteristics of wake vortices and their effect on aircraft are contained in the Air Traffic Services Planning Manual (Doc 9426), Part II, Section 5.

4.9.1 Wake turbulence categories and groups of aircraft

4.9.1.1 Except as provided for in 4.9.1.2, wake turbulence separation minima shall be based on a grouping of aircraft types into four categories according to the maximum certificated take-off mass as follows:

- a) SUPER (J) — aircraft types specified as such in Doc 8643, *Aircraft Type Designators*;
- b) HEAVY (H) — aircraft types of 136 000 kg or more, with the exception of aircraft types listed in Doc 8643 in the SUPER (J) category;
- c) MEDIUM (M) — aircraft types less than 136 000 kg but more than 7 000 kg; and
- d) LIGHT (L) — aircraft types of 7 000 kg or less.

Note.— The wake turbulence category for each aircraft type is contained in Doc 8643, *Aircraft Type Designators*.

4.9.1.2 When approved by the appropriate ATS authority, wake turbulence separation minima may be applied utilizing wake turbulence groups and shall be based on wake generation and resistance characteristics of the aircraft. These depend primarily on maximum certificated take-off mass, wing characteristics and speeds. The group designators are described as follows:

- a) GROUP A — aircraft types of 136 000 kg or more, and a wing span less than or equal to 80 m but greater than 74.68 m;
- b) GROUP B — aircraft types of 136 000 kg or more, and a wing span less than or equal to 74.68 m but greater than 53.34 m;
- c) GROUP C — aircraft types of 136 000 kg or more, and a wing span less than or equal to 53.34 m but greater than 38.1 m;
- d) GROUP D — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span greater than 32 m;
- e) GROUP E — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span less than or equal to 32 m but greater than 27.43 m;
- f) GROUP F — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span less than or equal to 27.43 m;
- g) GROUP G — aircraft types of 18 600 kg or less (without wing span criterion).

Note 1.— Information on the wake turbulence group for each aircraft type is contained in Doc 8643, *Aircraft Type Designators*.

Note 2.— Guidance on the implementation of wake turbulence separation between wake turbulence groups can be found in the Manual on Implementation of Wake Turbulence Separation Minima (Doc 10122).

4.9.1.2.1 Essential information, including the wake turbulence group designator as necessary, shall be provided to the controller when separation based on wake turbulence groups is to be applied.

4.9.1.3 Helicopters should be kept well clear of light aircraft when hovering or while air taxiing.

Note 1.— Helicopters produce vortices when in flight and there is some evidence that, per kilogram of gross mass, their vortices are more intense than those of fixed-wing aircraft. When hovering in ground effect or air taxiing, helicopters generate downwash producing high velocity outwash vortices to a distance approximately three times the diameter of the rotor.

Note 2.— The provisions governing wake turbulence separation minima are set forth in Chapter 5, Section 5.8, and Chapter 8, Section 8.7.3.

4.9.2 Indication of super or heavy wake turbulence category

For aircraft in the SUPER or HEAVY wake turbulence categories, the word “super” or “heavy” shall be included, as appropriate, immediately after the aircraft call sign in the initial radiotelephony contact between such aircraft and ATS units.

Note 1.— Wake turbulence categories are specified in the instructions for completing Item 9 of the flight plan in Appendix 2.

Note 2.— Wake turbulence Group A is equivalent to the SUPER wake turbulence category, and Groups B and C are equivalent to the HEAVY category.

4.10 ALTIMETER SETTING PROCEDURES

4.10.1 Expression of vertical position of aircraft

4.10.1.1 For flights in the vicinity of aerodromes and within terminal control areas the vertical position of aircraft shall, except as provided for in 4.10.1.2, be expressed in terms of altitudes at or below the transition altitude and in terms of flight levels at or above the transition level. While passing through the transition layer, vertical position shall be expressed in terms of flight levels when climbing and in terms of altitudes when descending.

4.10.1.2 When an aircraft which has been given clearance to land is completing its approach using atmospheric pressure at aerodrome elevation (QFE), the vertical position of the aircraft shall be expressed in terms of height above aerodrome elevation during that portion of its flight for which QFE may be used, except that it shall be expressed in terms of height above runway threshold elevation:

- a) for instrument runways, if the threshold is 2 m (7 ft) or more below the aerodrome elevation; and
- b) for precision approach runways.

4.10.1.3 For flights en route, the vertical position of aircraft shall be expressed in terms of:

- a) flight levels at or above the lowest usable flight level; and
- b) altitudes below the lowest usable flight level;

except where, on the basis of regional air navigation agreements, a transition altitude has been established for a specified area, in which case the provisions of 4.10.1.1 shall apply.

4.10.2 Determination of the transition level

4.10.2.1 The appropriate ATS unit shall establish the transition level to be used in the vicinity of the aerodrome(s) concerned and, when relevant, the terminal control area (TMA) concerned, for the appropriate period of time on the basis of QNH (altimeter subscale setting to obtain elevation when on the ground) reports and forecast mean sea level pressure, if required.

4.10.2.2 The transition level shall be the lowest flight level available for use above the transition altitude established for the aerodrome(s) concerned. Where a common transition altitude has been established for two or more aerodromes which are so closely located as to require coordinated procedures, the appropriate ATS units shall establish a common transition level to be used at any given time in the vicinity of the aerodrome and, when relevant, in the TMA concerned.

Note.— See 4.10.3.2 regarding the determination of the lowest usable flight level(s) for control areas.

4.10.3 Minimum cruising level for IFR flights

4.10.3.1 Except when specifically authorized by the appropriate authority, cruising levels below the minimum flight altitudes established by the State shall not be assigned.

4.10.3.2 ATC units shall, when circumstances warrant it, determine the lowest usable flight level or levels for the whole or parts of the control area for which they are responsible, use it when assigning flight levels and pass it to pilots on request.

Note 1.— Unless otherwise prescribed by the State concerned, the lowest usable flight level is that flight level which corresponds to, or is immediately above, the established minimum flight altitude.

Note 2.— The portion of a control area for which a particular lowest usable flight level applies is determined in accordance with air traffic services requirements.

Note 3.— The objectives of the air traffic control service as prescribed in Annex 11 do not include prevention of collision with terrain. The procedures prescribed in this document do not relieve pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in this respect. When an IFR flight is vectored or is given a direct routing which takes the aircraft off an ATS route, the procedures in Chapter 8, 8.6.5.2 apply.

4.10.4 Provision of altimeter setting information

4.10.4.1 Appropriate ATS units shall at all times have available for transmission to aircraft in flight, on request, the information required to determine the lowest flight level which will ensure adequate terrain clearance on routes or segments of routes for which this information is required.

Note.— If so prescribed on the basis of regional air navigation agreements, this information may consist of climatological data.

4.10.4.2 Flight information centres and ACCs shall have available for transmission to aircraft, on request, an appropriate number of QNH reports or forecast pressures for the FIRs and control areas for which they are responsible, and for those adjacent.

4.10.4.3 The flight crew shall be provided with the transition level in due time prior to reaching it during descent. This may be accomplished by voice communications, ATIS broadcast or data link.

4.10.4.4 The transition level shall be included in approach clearances when so prescribed by the appropriate authority or requested by the pilot.

4.10.4.5 A QNH altimeter setting shall be included in the descent clearance when first cleared to an altitude below the transition level, in approach clearances or clearances to enter the traffic circuit, and in taxi clearances for departing aircraft, except when it is known that the aircraft has already received the information.

4.10.4.6 A QFE altimeter setting shall be provided to aircraft on request or on a regular basis in accordance with local arrangements; it shall be the QFE for the aerodrome elevation except for:

- a) non-precision approach runways, if the threshold is 2 m (7 ft) or more below the aerodrome elevation; and
- b) precision approach runways;

in which cases the QFE for the relevant runway threshold shall be provided.

4.10.4.7 Altimeter settings provided to aircraft shall be rounded down to the nearest lower whole hectopascal.

Note 1.— Unless otherwise prescribed by the State concerned, the lowest usable flight level is that flight level which corresponds to, or is immediately above, the established minimum flight altitude.

Note 2.— The portion of a control area for which a particular lowest usable flight level applies is determined in accordance with air traffic services requirements.

Note 3.— See Foreword, Note 2 to paragraph 2.1.

4.11 POSITION REPORTING

4.11.1 Transmission of position reports

4.11.1.1 On routes defined by designated significant points, position reports shall be made by the aircraft when over, or as soon as possible after passing, each designated compulsory reporting point, except as provided in 4.11.1.3 and 4.11.3. Additional reports over other points may be requested by the appropriate ATS unit.

4.11.1.2 On routes not defined by designated significant points, position reports shall be made by the aircraft as soon as possible after the first half hour of flight and at hourly intervals thereafter, except as provided in 4.11.1.3. Additional reports at shorter intervals of time may be requested by the appropriate ATS unit.

4.11.1.3 Under conditions specified by the appropriate ATS authority, flights may be exempted from the requirement to make position reports at each designated compulsory reporting point or interval. In applying this, account should be taken of the meteorological requirement for the making and reporting of routine aircraft observations.

Note.— This is intended to apply in cases where adequate flight progress data are available from other sources, e.g. radar or ADS-B (see Chapter 8, 8.6.4.4), or ADS-C (see Chapter 13) and in other circumstances where the omission of routine reports from selected flights is found to be acceptable.

4.11.1.4 The position reports required by 4.11.1.1 and 4.11.1.2 shall be made to the ATS unit serving the airspace in which the aircraft is operated. In addition, when so prescribed by the appropriate ATS authority in aeronautical information publications or requested by the appropriate ATS unit, the last position report before passing from one FIR or control area to an adjacent FIR or control area shall be made to the ATS unit serving the airspace about to be entered.

4.11.1.5 If a position report is not received at the expected time, subsequent control shall not be based on the assumption that the estimated time is accurate. Immediate action shall be taken to obtain the report if it is likely to have any bearing on the control of other aircraft.

4.11.2 Contents of voice position reports

4.11.2.1 The position reports required by 4.11.1.1 and 4.11.1.2 shall contain the following elements of information, except that elements d), e) and f) may be omitted from position reports transmitted by radiotelephony, when so prescribed on the basis of regional air navigation agreements:

- a) aircraft identification;
- b) position;
- c) time;
- d) flight level or altitude, including passing level and cleared level if not maintaining the cleared level;
- e) next position and time over; and
- f) ensuing significant point.

4.11.2.1.1 Element d), flight level or altitude, shall, however, be included in the initial call after a change of air-ground voice communication channel.

4.11.2.2 When assigned a speed to maintain, the flight crew shall include this speed in their position reports. The assigned speed shall also be included in the initial call after a change of air-ground voice communication channel, whether or not a full position report is required.

Note.— Omission of element d) may be possible when flight level or altitude, as appropriate, derived from pressure-altitude information can be made continuously available to controllers in labels associated with the position indication of aircraft and when adequate procedures have been developed to guarantee the safe and efficient use of this altitude information.

4.11.3 Radiotelephony procedures for air-ground voice communication channel changeover

When so prescribed by the appropriate ATS authority, the initial call to an ATC unit after a change of air-ground voice communication channel shall contain the following elements:

- a) designation of the station being called;
- b) call sign and, for aircraft in the SUPER and HEAVY wake turbulence categories, the word “super” or “heavy” respectively;

- c) level, including passing and cleared levels if not maintaining the cleared level;
- d) speed, if assigned by ATC; and
- e) additional elements, as required by the appropriate ATS authority.

4.11.4 Transmission of ADS-C reports

The position reports shall be made automatically to the ATS unit serving the airspace in which the aircraft is operating. The requirements for the transmission and contents of automatic dependent surveillance — contract (ADS-C) reports shall be established by the controlling ATC unit on the basis of current operational conditions and communicated to the aircraft and acknowledged through an ADS-C agreement.

4.11.5 Contents of ADS-C reports

4.11.5.1 ADS-C reports shall be composed of data blocks selected from the following:

- a) **Aircraft identification**
- b) **Basic ADS-C**
 - latitude
 - longitude
 - altitude
 - time
 - figure of merit

Note.— The basic ADS-C block is mandatory and is included in all ADS-C reports.

- c) **Ground vector**
 - track
 - ground speed
 - rate of climb or descent
- d) **Air vector**
 - heading
 - Mach or IAS
 - rate of climb or descent
- e) **Projected profile**
 - next waypoint
 - estimated altitude at next waypoint
 - estimated time at next waypoint
 - (next + 1) waypoint
 - estimated altitude at (next + 1) waypoint
 - estimated time at (next + 1) waypoint
- f) **Meteorological information**
 - wind speed
 - wind direction
 - wind quality flag (if available)

temperature
 turbulence (if available)
 humidity (if available)

Note.— The specifications for the elements in the meteorological information data block, including their ranges and resolutions, are shown in Appendix 3 to Annex 3.

g) **Short-term intent**

latitude at projected intent point
 longitude at projected intent point
 altitude at projected intent point
 time of projection

If an altitude, track or speed change is predicted to occur between the aircraft's current position and the projected intent point, additional information would be provided in an intermediate intent block as follows:

distance from current point to change point
 track from current point to change point
 altitude at change point
 predicted time to change point

4.11.5.2 The basic ADS-C data block shall be required from all ADS-C-equipped aircraft. Remaining ADS-C data blocks shall be included as necessary. In addition to any requirements concerning its transmission for ATS purposes, data block f) (Meteorological information) shall be transmitted in accordance with Annex 3, 5.3.1. ADS-C emergency and/or urgency reports shall include the emergency and/or urgency status in addition to the relevant ADS-C report information.

4.11.6 Data format of ADS-B messages

Note.— Data formats of ADS-B messages can be found in Annex 10 — Aeronautical Telecommunications, Volume III — Communication Systems, Part I — Digital Data Communication Systems, and Volume IV — Surveillance and Collision Avoidance Systems.

4.12 REPORTING OF OPERATIONAL AND METEOROLOGICAL INFORMATION

4.12.1 General

4.12.1.1 When operational and/or routine meteorological information is to be reported, using data link, by an aircraft en route at times where position reports are required in accordance with 4.11.1.1 and 4.11.1.2, the position report shall be given in accordance with 4.11.5.2 (requirements concerning transmission of meteorological information from ADS-C equipped aircraft), or in the form of a routine air-report. Special aircraft observations shall be reported as special air-reports. All air-reports shall be reported as soon as is practicable.

4.12.2 Contents of routine air-reports

4.12.2.1 Routine air-reports transmitted by data link, when ADS-C is not being applied, shall give information relating to such of the following elements as are necessary for compliance with 4.12.2.2:

Section 1.— Position information:

- 1) aircraft identification
- 2) position
- 3) time
- 4) flight level or altitude
- 5) next position and time over
- 6) ensuing significant point

Section 2.— Operational information:

- 7) estimated time of arrival
- 8) endurance

Section 3.— Meteorological information:

- 9) wind direction
- 10) wind speed
- 11) wind quality flag
- 12) air temperature
- 13) turbulence (if available)
- 14) humidity (if available).

4.12.2.2 Section 1 of the air-report is obligatory, except that elements 5) and 6) thereof may be omitted when so prescribed on the basis of regional air navigation agreements. Section 2 of the air-report, or a portion thereof, shall only be transmitted when so requested by the operator or a designated representative, or when deemed necessary by the pilot-in-command. Section 3 of the air-report shall be transmitted in accordance with Annex 3, Chapter 5.

Note.— While element 4), flight level or altitude, may, in accordance with 4.11.2.1, be omitted from the contents of a position report transmitted by radiotelephony when so prescribed on the basis of regional air navigation agreements, that element may not be omitted from Section 1 of an air-report.

4.12.3 Contents of special air-reports

4.12.3.1 Special air-reports shall be made by all aircraft whenever the following conditions are encountered or observed:

- a) moderate or severe turbulence; or
- b) moderate or severe icing; or
- c) severe mountain wave; or
- d) thunderstorms, without hail that are obscured, embedded, widespread or in squall lines; or
- e) thunderstorms, with hail that are obscured, embedded, widespread or in squall lines; or
- f) heavy duststorm or heavy sandstorm; or
- g) volcanic ash cloud; or
- h) pre-eruption volcanic activity or a volcanic eruption; or

- i) as of 5 November 2020 runway braking action encountered is not as good as reported.

Note.— *Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.*

In addition, in the case of transonic and supersonic flight:

- j) moderate turbulence; or
- k) hail; or
- l) cumulonimbus clouds.

4.12.3.2 When air-ground data link is used, special air-reports shall contain the following elements:

message type designator
aircraft identification

Data block 1:

latitude
longitude
pressure-altitude
time

Data block 2:

wind direction
wind speed
wind quality flag
air temperature
turbulence (if available)
humidity (if available)

Data block 3:

condition prompting the issuance of the special air-report; to be selected from the list a) to k) presented under 4.12.3.1.

4.12.3.3 When voice communications are used, special air-reports shall contain the following elements:

Message type designator

Section 1.— Position information

- 1) aircraft identification
- 2) position
- 3) time
- 4) flight level or altitude

Section 3.— Meteorological information

- 5) condition prompting the issuance of the special air-report; to be selected from the list a) to k) presented under 4.12.3.1.

4.12.4 Compilation and transmission of air-reports by voice communications

4.12.4.1 Forms based on the model AIREP SPECIAL form at Appendix 1 shall be provided for the use of flight crews in compiling the reports. The detailed instructions for reporting, as given at Appendix 1, shall be complied with.

4.12.4.2 The detailed instructions, including the formats of messages and the phraseologies given at Appendix 1, shall be used by flight crews when transmitting air-reports and by air traffic services units when retransmitting such reports.

Note.— *Increasing use of air-reports in automated systems makes it essential that the elements of such reports be transmitted in the order and form prescribed.*

4.12.5 Recording of special air-reports of volcanic activity

Special air-reports containing observations of volcanic activity shall be recorded on the special air-report of volcanic activity form. Forms based on the model form for special air-reports of volcanic activity at Appendix 1 shall be provided for flight crews operating on routes which could be affected by volcanic ash clouds.

Note.— *The recording and reporting instructions may conveniently be printed on the back of the special air-report of volcanic activity form.*

4.12.6 Forwarding of meteorological information

4.12.6.1 When receiving ADS-C reports which contain a meteorological information block, air traffic services units shall relay the basic ADS-C and meteorological information blocks and aircraft registration without delay to the world area forecast centres (WAFCs).

Note.— *Specifications concerning the format to be used in the relay of meteorological information to the WAFCs are contained in the Manual on Aeronautical Meteorological Practice (Doc 8896).*

4.12.6.2 When receiving special air-reports by data link communications, air traffic services units shall forward them without delay to their associated meteorological watch office, the WAFCs, and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

4.12.6.3 As of 5 November 2020, when receiving special air-reports by voice communications, air traffic services units shall forward them without delay to their associated meteorological watch offices, with the exception of conditions applying to runway braking action encountered.

4.12.7 Forwarding of braking action information

As of 5 November 2020, when receiving special air-reports by voice communications concerning braking action encountered that is not as good as reported, air traffic service units shall forward them without delay to the appropriate aerodrome operator.

4.13 PRESENTATION AND UPDATING OF FLIGHT PLAN AND CONTROL DATA

4.13.1 General

The appropriate authority shall establish provisions and procedures for the presentation to controllers, and subsequent updating, of flight plan and control data for all flights being provided with a service by an ATS unit. Provision shall also be made for the presentation of any other information required or desirable for the provision of ATS.

4.13.2 Information and data to be presented

4.13.2.1 Sufficient information and data shall be presented in such a manner as to enable the controller to have a complete representation of the current air traffic situation within the controller's area of responsibility and, when relevant, movements on the manoeuvring area of aerodromes. The presentation shall be updated in accordance with the progress of aircraft, in order to facilitate the timely detection and resolution of conflicts as well as to facilitate and provide a record of coordination with adjacent ATS units and control sectors.

4.13.2.2 An appropriate representation of the airspace configuration, including significant points and information related to such points, shall be provided. Data to be presented shall include relevant information from flight plans and position reports as well as clearance and coordination data. The information display may be generated and updated automatically, or the data may be entered and updated by authorized personnel.

4.13.2.3 Requirements regarding other information to be displayed, or to be available for display, shall be specified by the appropriate authority.

4.13.3 Presentation of information and data

4.13.3.1 The required flight plan and control data may be presented through the use of paper flight progress strips or electronic flight progress strips, by other electronic presentation forms or by a combination of presentation methods.

4.13.3.2 The method(s) of presenting information and data shall be in accordance with Human Factors principles. All data, including data related to individual aircraft, shall be presented in a manner minimizing the potential for misinterpretation or misunderstanding.

4.13.3.3 Means and methods for manually entering data in ATC automation systems shall be in accordance with Human Factors principles.

4.13.3.4 When flight progress strips (FPS) are used, there should be at least one individual FPS for each flight. The number of FPS for individual flights shall be sufficient to meet the requirements of the ATS unit concerned. Procedures for annotating data and provisions specifying the types of data to be entered on FPS, including the use of symbols, shall be specified by the appropriate ATS authority.

Note.— Guidance material on the use of paper FPS is contained in the Air Traffic Services Planning Manual (Doc 9426).

4.13.3.5 Data generated automatically shall be presented to the controller in a timely manner. The presentation of information and data for individual flights shall continue until such time as the data is no longer required for the purpose of providing control, including conflict detection and the coordination of flights, or until terminated by the controller.

4.13.4 Recording and retention of data for investigative purposes

Paper FPS shall be retained for a period of at least 30 days. Electronic flight progress and coordination data shall be recorded and retained for at least the same period of time.

4.14 FAILURE OR IRREGULARITY OF SYSTEMS AND EQUIPMENT

ATC units shall immediately report in accordance with local instructions any failure or irregularity of communication, navigation and surveillance systems or any other safety-significant systems or equipment which could adversely affect the safety or efficiency of flight operations and/or the provision of air traffic control service.

4.15 DATA LINK COMMUNICATIONS INITIATION PROCEDURES

4.15.1 General

Note 1.— Provisions concerning the data link initiation capability (DLIC) are contained in Annex 10, Volume II, Chapter 8.

Note 2.— Guidance material relating to the implementation of DLIC can be found in the Global Operational Data Link (GOLD) Manual (Doc 10037).

4.15.1.1 Before entering an airspace where data link applications are used by the ATS unit, data link communications shall be initiated between the aircraft and the ATS unit in order to register the aircraft and, when necessary, allow the start of a data link application. This shall be initiated by the aircraft, either automatically or by the pilot, or by the ATS unit on address forwarding.

4.15.1.2 The logon address associated with an ATS unit shall be published in Aeronautical Information Publications in accordance with Annex 15.

Note.— A given FIR may have multiple logon addresses; and more than one FIR may share the same logon address.

4.15.2 Aircraft initiation

On receipt of a valid data link initiation request from an aircraft approaching or within a data link service area, the ATS unit shall accept the request and, if able to correlate it with a flight plan, shall establish a connection with the aircraft.

4.15.3 ATS unit forwarding

Where the ground system initially contacted by the aircraft is able to pass the necessary aircraft address information to another ATS unit, it shall pass the aircraft updated ground addressing information for data link applications previously coordinated in sufficient time to permit the establishment of data link communications.

4.15.4 Failure

4.15.4.1 In the case of a data link initiation failure, the data link system shall provide an indication of the failure to the appropriate ATS unit(s). The data link system shall also provide an indication of the failure to the flight crew when a data link initiation failure results from a logon initiated by the flight crew.

Note.— When the aircraft's logon request results from responding to a contact request by a transferring ATS unit, then both ATS units will receive the indication.

4.15.4.2 The ATS unit shall establish procedures to resolve, as soon as practicable, data link initiation failures. Procedures should include, as a minimum, verifying that the aircraft is initiating a data link request with the appropriate ATS unit (i.e. the aircraft is approaching or within the ATS unit's control area), and if so:

- a) when a flight plan is available, verify that the aircraft identification, aircraft registration, or aircraft address and other details contained in the data link initiation request correspond with details in the flight plan, and where differences are detected, verify which is the correct information and make the necessary changes; or
- b) when a flight plan is not available, create a flight plan with sufficient information in the flight data processing system to achieve a successful data link initiation; then
- c) arrange for the re-initiation of the data link.

4.15.4.3 The aircraft operator shall establish procedures to resolve, as soon as practicable, data link initiation failures. Procedures should include, as a minimum, that the pilot:

- a) verify the correctness and consistency of the flight plan information available in the FMS or equipment from which the data link is initiated, and where differences are detected, make the necessary changes;
- b) verify the correct address of the ATS unit; then
- c) re-initiate the data link.

- b) in airspace where strategic lateral offsets are authorized, that a lateral offset is not being applied.

5.4.1.2.1.2.3 In order to minimize the possibility of operational errors, waypoints contained in the navigation database or uplinked to the aircraft flight management system should be used in lieu of manually entered waypoints, when applying GNSS-based track separation. In the event that it is operationally restrictive to use waypoints contained in the navigation database, the use of waypoints that require manual entry by pilots should be limited to a half or whole degree of latitude and longitude.

5.4.1.2.1.2.4 GNSS-based track separation shall not be applied in cases of pilot-reported receiver autonomous integrity monitoring (RAIM) outages.

Note.— For the purpose of applying GNSS-based lateral separation minima, distance and track information derived from an integrated navigation system incorporating GNSS input is regarded as equivalent to GNSS distance and track.

5.4.1.2.1.2.5 GNSS receivers used for applying separation shall meet the requirements in Annex 10, Volume I, and be indicated in the flight plan.

5.4.1.2.1.3 *By use of different navigation aids or methods.* Lateral separation between aircraft using different navigation aids, or when one aircraft is using RNAV equipment, shall be established by ensuring that the derived protected airspaces for the navigation aid(s) or RNP do not overlap.

5.4.1.2.1.4 *Lateral separation of aircraft on published instrument flight procedures for arrivals and departures.*

5.4.1.2.1.4.1 Lateral separation of departing and/or arriving aircraft, using instrument flight procedures, will exist:

- a) where the distance between any combination of RNAV 1 with RNAV 1, or RNP 1, RNP APCH or RNP AR APCH tracks is not less than 13 km (7 NM); or
- b) where the distance between any combination of RNP 1, RNP APCH or RNP AR APCH tracks is not less than 9.3 km (5 NM); or
- c) where the protected areas of tracks designed using obstacle clearance criteria do not overlap and provided operational error is considered.

Note 1.— Distance values contained in a) and b) above were determined by collision risk analysis using multiple navigation specifications. Information on this analysis is contained in Circular 324, Guidelines for Lateral Separation of Arriving and Departing Aircraft on Published Adjacent Instrument Flight Procedures.

Note 2.— Circular 324 also contains information on separation of arrival and departure tracks using non-overlapping protected areas based on obstacle clearance criteria, as provided for in the Procedures for Air Navigation Services — Aircraft Operations, Volume II — Construction of Visual and Instrument Flight Procedures (PANS-OPS, Doc 8168).

Note 3.— Provisions concerning reductions in separation minima are contained in Chapter 2, ATS Safety Management, and Chapter 5, Separation Methods and Minima, Section 5.11.

Note 4.— Guidance concerning the navigation specifications is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

5.4.1.2.1.5 *RNAV operations where RNP is specified on parallel tracks or ATS routes.* Within designated airspace or on designated routes, where RNP is specified, lateral separation between RNAV-equipped aircraft may be obtained by requiring aircraft to be established on the centre lines of parallel tracks or ATS routes spaced at a distance which ensures that the protected airspace of the tracks or ATS routes does not overlap.

Note.— The spacing between parallel tracks or between parallel ATS route centre lines for which an RNP type is required will be dependent upon the relevant RNP type specified. Guidance material related to the spacing between tracks or ATS routes based on RNP type is contained in Annex 11, Attachment B.

5.4.1.2.1.6 *Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes.* Within designated airspace or on designated routes, lateral separation between aircraft operating on parallel or non-intersecting tracks or ATS routes shall be established in accordance with Table 5-2:

Table 5-2. Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes

Minimum Spacing Between Tracks		Performance Requirements			Additional Requirements
Airspace where SLOP is not authorized, or is only authorized up to 0.5 NM	Airspace where SLOP up to 2 NM is authorized	Navigation	Communication	Surveillance	
93 km (50 NM)	93 km (50 NM)	RNAV 10 (RNP 10) RNP 4 RNP 2	Types of communication other than direct controller-pilot VHF voice		
37 km (20 NM)	42.6 km (23 NM)	RNP 4 RNP 2	RCP 240	RSP 180	Conformance monitoring shall be ensured by establishing an ADS-C event contract specifying a lateral deviation change event with a maximum of 5 NM threshold and a waypoint change event
37 km (20 NM)	42.6 km (23 NM)	RNP 2 or GNSS equipage	Types of communication other than direct controller-pilot VHF voice		While one aircraft climbs/descends through the level of another aircraft remaining in level flight
27.8 km (15 NM)	33.4 km (18 NM)	RNP 2 or GNSS equipage	Direct controller-pilot VHF voice communications		
16.7 km (9 NM)	22.3 km (12 NM)	RNP 4 RNP 2	RCP 240	RSP 180	While one aircraft climbs/descends through the level of another aircraft remaining in level flight
13 km (7 NM)	19 km (10 NM)	RNP 2 or GNSS equipage	Direct controller-pilot VHF voice communications		While one aircraft climbs/descends through the level of another aircraft remaining in level flight

Note 1.— Guidance material for the implementation of the navigation capability supporting the lateral separation minima above is contained in the Performance-based Navigation (PBN) Manual (Doc 9613). Information regarding the implementation of the lateral separation minima above is contained in Circular 349, Guidelines for the Implementation of Lateral Separation Minima.

Note 2.— Guidance material for the implementation of communication and surveillance capability supporting the lateral separation minima above is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869) and the Global Operational Data Link (GOLD) Manual (Doc 10037).

Note 3.— See Appendix 2, ITEM 10: EQUIPMENT AND CAPABILITIES, in relation to the GNSS prescribed in Table 5-2 above.

Note 4.— Refer to 16.5 for further details regarding application of strategic lateral offset procedures (SLOP).

- iii) the same waypoint when both aircraft are utilizing GNSS; and
- 2) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed (see Figure 5-22);

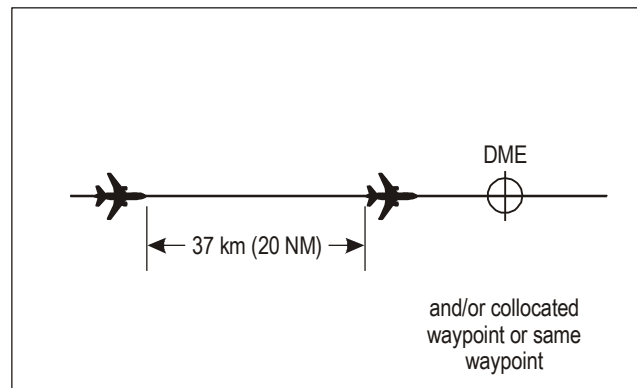


Figure 5-22. 37 km (20 NM) DME and/or GNSS-based separation between aircraft on same track and same level (see 5.4.2.3.3.1 a))

- b) 19 km (10 NM), provided:
 - 1) the leading aircraft maintains a true airspeed of 37 km/h (20 kt) or more faster than the succeeding aircraft;
 - 2) each aircraft utilizes:
 - i) the same “on-track” DME station when both aircraft are utilizing DME; or
 - ii) an “on-track” DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS; or
 - iii) the same waypoint when both aircraft are utilizing GNSS; and
 - 3) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at such intervals as are necessary to ensure that the minimum is established and will not be infringed (see Figure 5-23).

5.4.2.3.3.2 *Aircraft on crossing tracks.* The longitudinal separation prescribed in 5.4.2.3.3.1 shall also apply provided each aircraft reports distance from the DME station and/or collocated waypoint or same waypoint located at the crossing point of the tracks and that the relative angle between the tracks is less than 90 degrees (see Figures 5-24A and 5-24B).

5.4.2.3.4 AIRCRAFT CLIMBING AND DESCENDING

5.4.2.3.4.1 *Aircraft on the same track:* 19 km (10 NM) while vertical separation does not exist, provided:

- a) each aircraft utilizes:

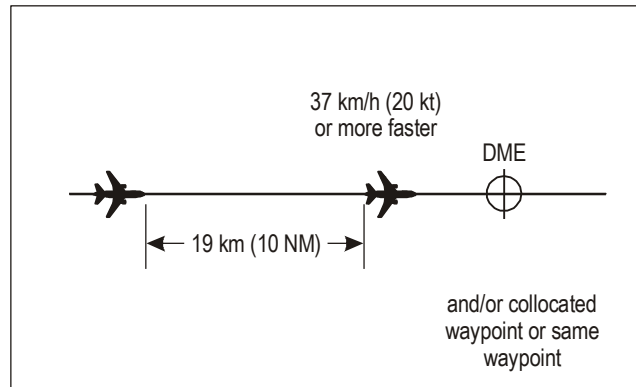


Figure 5-23. 19 km (10 NM) DME and/or GNSS-based separation between aircraft on same track and same level (see 5.4.2.3.3.1 b))

- i) the same “on-track” DME station when both aircraft are utilizing DME; or
 - ii) an “on-track” DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS; or
 - iii) the same waypoint when both aircraft are utilizing GNSS; and
- b) one aircraft maintains a level while vertical separation does not exist; and
 - c) separation is established by obtaining simultaneous DME and/or GNSS readings from the aircraft (see Figures 5-25A and 5-25B).

Note.— To facilitate application of the procedure where a considerable change of level is involved, a descending aircraft may be cleared to some convenient level above the lower aircraft, or a climbing aircraft to some convenient level below the higher aircraft, to permit a further check on the separation that will be obtained while vertical separation does not exist.

5.4.2.3.4.2 *Aircraft on reciprocal tracks.* Aircraft utilizing on-track DME and/or collocated waypoint or same waypoint may be cleared to climb or descend to or through the levels occupied by other aircraft utilizing on-track DME and/or collocated waypoint or same waypoint, provided that it has been positively established that the aircraft have passed each other and are at least 10 NM apart, or such other value as prescribed by the appropriate ATS authority.

5.4.2.4 LONGITUDINAL SEPARATION MINIMA WITH MACH NUMBER TECHNIQUE BASED ON TIME

5.4.2.4.1 Aircraft subject to Mach number technique shall adhere to the true Mach number approved by ATC and shall request ATC approval before making any changes thereto. If it is essential to make an immediate temporary change in the Mach number (e.g. due to turbulence), ATC shall be notified as soon as possible that such a change has been made.

5.4.2.4.2 If it is not feasible, due to aircraft performance, to maintain the last assigned Mach number during en-route climbs and descents, pilots of aircraft concerned shall advise ATC at the time of the climb/descent request.

5.4.2.4.3 When the Mach number technique is applied and provided that:

- a) the aircraft concerned have reported over the same common point and follow the same track or continuously diverging tracks until some other form of separation is provided; or
- b) if the aircraft have not reported over the same common point and it is possible to ensure, by radar, ADS-B or other means, that the appropriate time interval will exist at the common point from which they either follow the same track or continuously diverging tracks;

minimum longitudinal separation between aircraft on the same track, whether in level, climbing or descending flight shall be:

- 1) 10 minutes; or
- 2) between 9 and 5 minutes inclusive, provided that:

the preceding aircraft is maintaining a true Mach number greater than the following aircraft in accordance with the following:

- 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;
- 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;
- 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;
- 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;
- 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

5.4.2.4.4 When the 10-minute longitudinal separation minimum with Mach number technique is applied, the preceding aircraft shall maintain a true Mach number equal to or greater than that maintained by the following aircraft.

5.4.2.5 LONGITUDINAL SEPARATION MINIMA WITH MACH NUMBER TECHNIQUE BASED ON DISTANCE USING RNAV

Note.— Guidance material on RNAV operations is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

5.4.2.5.1 Aircraft subject to Mach number technique shall adhere to the true Mach number approved by ATC and shall request ATC approval before making any changes thereto. If it is essential to make an immediate temporary change in the Mach number (e.g. due to turbulence), ATC shall be notified as soon as possible that such a change has been made.

5.4.2.5.1.1 If it is not feasible, due to aircraft performance, to maintain the last assigned Mach number during en-route climbs and descents, pilots of aircraft concerned shall advise ATC at the time of the climb/descent request.

5.4.2.5.2 RNAV distance-based separation minima shall not be applied after ATC has received pilot advice indicating navigation equipment deterioration or failure.

5.4.2.5.3 Separation shall be established by maintaining not less than the specified distance between aircraft positions as reported by reference to RNAV equipment. Direct controller-pilot communications should be maintained, while such separation is used. Where high frequency or general purpose extended range very high frequency air-ground communication channels are used for area control service and are worked by air-ground communicators, suitable arrangements shall be made to permit direct controller-pilot communications, or monitoring by the controller of all air-ground communications.

5.4.2.5.3.1 To assist pilots to readily provide the required RNAV distance information, such position reports should, wherever possible, be referenced to a common waypoint ahead of both aircraft.

5.4.2.5.4 RNAV distance-based separation may be applied between RNAV-equipped aircraft when operating on designated RNAV routes or on ATS routes defined by VOR.

5.4.2.5.5 A 150 km (80 NM) RNAV distance-based separation minimum with Mach number technique may be used on same-direction tracks in lieu of a 10-minute longitudinal separation minimum with Mach number technique, provided:

- a) each aircraft reports its distance to or from the same “on-track” common point;
- b) separation between aircraft at the same level is checked by obtaining simultaneous RNAV distance readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed (see Figure 5-26);
- c) separation between aircraft climbing or descending is established by obtaining simultaneous RNAV distance readings from the aircraft (see Figures 5-27A and 5-27B); and
- d) in the case of aircraft climbing or descending, one aircraft maintains a level while vertical separation does not exist.

5.4.2.5.6 When the 150 km (80 NM) longitudinal separation minimum with Mach number technique is applied, the preceding aircraft shall maintain a true Mach number equal to or greater than that maintained by the following aircraft.

Note.— To facilitate application of the procedure where a considerable change of level is involved, a descending aircraft may be cleared to some convenient level above the lower aircraft, or a climbing aircraft to some convenient level below the higher aircraft, to permit a further check on the separation that will be obtained while vertical separation does not exist.

5.4.2.5.7 *Aircraft on reciprocal tracks.* Aircraft utilizing RNAV may be cleared to climb or descend to or through the levels occupied by other aircraft utilizing RNAV provided it has been positively established by simultaneous RNAV distance readings to or from the same “on-track” common point that the aircraft have passed each other and are at least 150 km (80 NM) apart (see Figure 5-28).

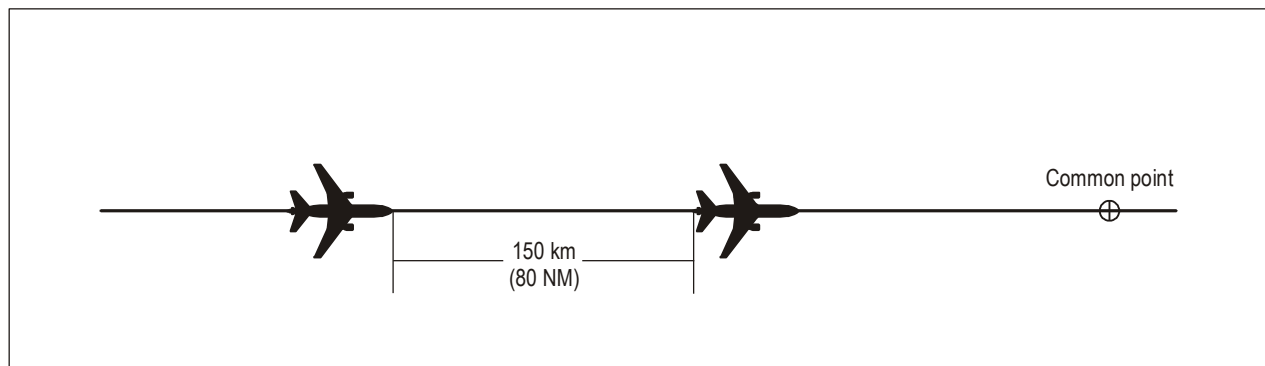


Figure 5-26. 150 km (80 NM) RNAV-based separation between aircraft at the same level (see 5.4.2.5.5 b))

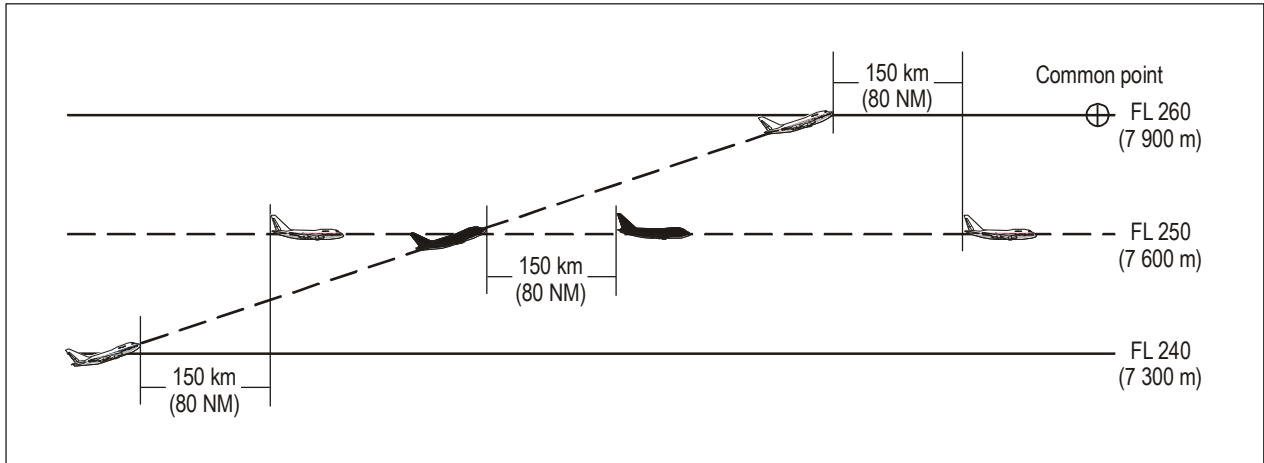


Figure 5-27A. 150 km (80 NM) RNAV-based separation between aircraft climbing and on same track (see 5.4.2.5.5 c)

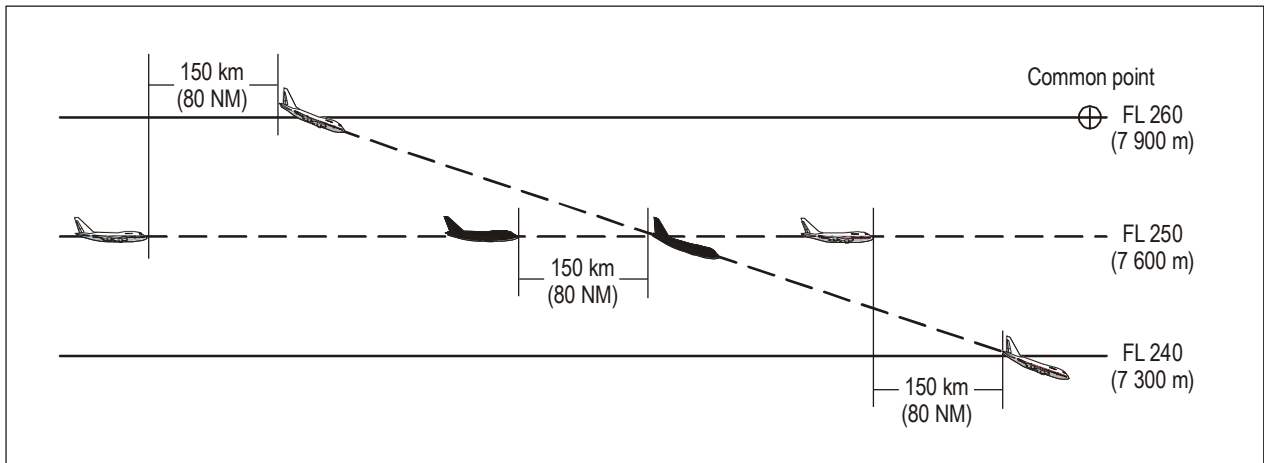


Figure 5-27B. 150 km (80 NM) RNAV-based separation between aircraft descending and on same track (see 5.4.2.5.5 c)

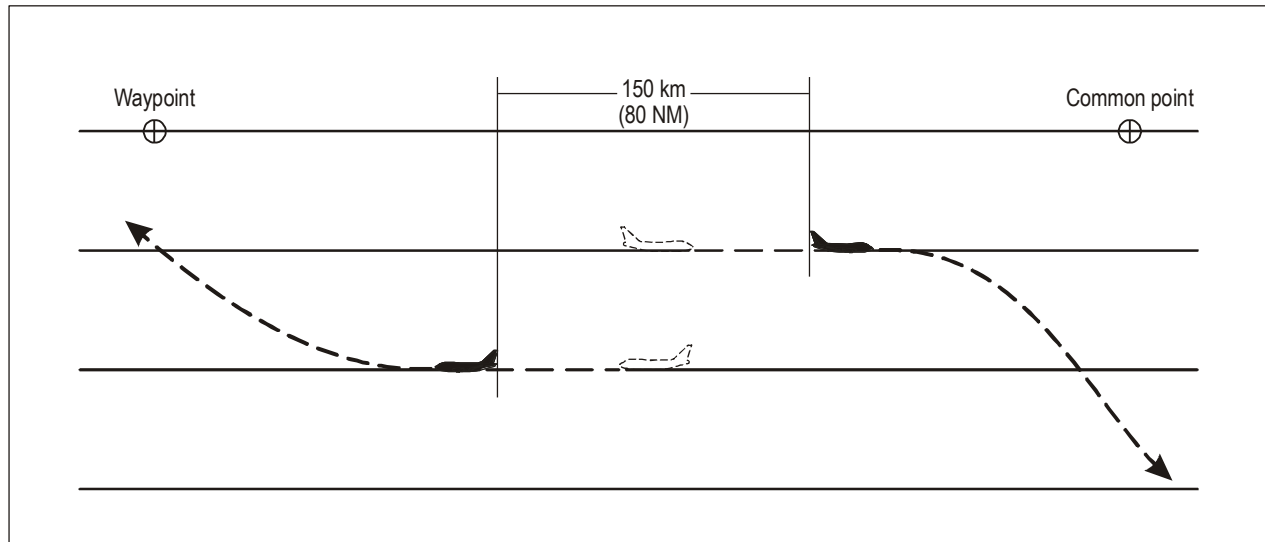


Figure 5-28. 150 km (80 NM) RNAV-based separation between aircraft on reciprocal tracks (see 5.4.2.5.7)

5.4.2.6 LONGITUDINAL SEPARATION MINIMA BASED ON DISTANCE USING RNAV WHERE RNP IS SPECIFIED

Note.— Guidance material is contained in Attachment B to Annex 11, the Performance-based Navigation (PBN) Manual (Doc 9613), the Air Traffic Services Planning Manual (Doc 9426) and the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

5.4.2.6.1 Within designated airspace, or on designated routes, separation minima in accordance with the provisions of this section (5.4.2.6) may be used, subject to regional air navigation agreements.

5.4.2.6.2 Separation shall be established by maintaining not less than the specified distance between aircraft positions as reported by reference to the same “on-track” common point, whenever possible ahead of both aircraft, or by means of an automated position reporting system.

Note.— The term “on track” means that the aircraft is flying either directly inbound to or directly outbound from the station or waypoint.

5.4.2.6.2.1 When information is received indicating navigation equipment failure or deterioration below the navigation performance requirements, ATC shall then, as required, apply alternative separation minima.

5.4.2.6.2.2 Direct controller-pilot communications shall be maintained while applying a distance-based separation minima. Direct controller-pilot communications shall be voice or CPDLC. The communication criteria necessary for CPDLC to satisfy the requirement for direct controller-pilot communications shall be established by an appropriate safety risk assessment.

Note.— The communication criteria which are used as a basis for the derivation of the separation minima in this section are set out in Appendix 5 of the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689). Guidance material for CPDLC is contained in the Manual of Air Traffic Services Data Link Applications (Doc 9694).

5.4.2.6.2.2.1 Prior to and during the application of a distance-based separation minimum, the controller should determine the adequacy of the available communication link, considering the time element required to receive replies from two or more aircraft, and the overall workload/traffic volume associated with the application of such minima.

5.4.2.6.2.3 When aircraft are at, or are expected to reduce to, the minimum separation applicable, speed control techniques, including assigning Mach number, shall be applied to ensure that the minimum distance exists throughout the period of application of the minima.

5.4.2.6.3 *LONGITUDINAL DISTANCE-BASED SEPARATION MINIMA
IN AN RNP RNAV ENVIRONMENT NOT USING ADS-C*

5.4.2.6.3.1 For aircraft cruising, climbing or descending on the same track, the following separation minimum may be used:

<i>Separation minimum</i>	<i>RNP type</i>	<i>Communication requirement</i>	<i>Surveillance requirement</i>	<i>Distance verification requirements</i>
93 km (50 NM)	10	Direct controller-pilot communications	Procedural position reports	At least every 24 minutes

Note 1.— Where a considerable change of level is involved using distance-based separation, a descending aircraft may be cleared to some convenient level above the lower aircraft, or a climbing aircraft to some convenient level below the higher aircraft (e.g. 1 200 m (4 000 ft) or less) to permit a further check on the separation that will be maintained while vertical separation does not exist.

Note 2.— It should be noted that the separation minimum depicted above is based on safety risk assessments performed specifically for a particular network of tracks or routes. As such, the assessments evaluated traffic characteristics which might be unique to the network being assessed.

Note 3.— The separation minimum above was developed in accordance with a collision risk analysis which dictates conditions under which this separation can be applied.

Note 4.— Detailed information on the analysis used to determine the separation minimum and on performing safety risk assessments is contained in the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

5.4.2.6.3.2 During the application of the 93 km (50 NM) separation, when an aircraft fails to report its position, the controller shall take action within 3 minutes to establish communication. If communication has not been established within 8 minutes of the time the report should have been received, the controller shall take action to apply an alternative form of separation.

5.4.2.6.3.3 Where automated position reporting applies, a common time reference shall be used.

5.4.2.6.3.4 *Aircraft on reciprocal tracks.* Aircraft may be cleared to climb or descend to or through the levels occupied by the other provided that it has been positively established that the aircraft have passed each other and the distance between them is equal to at least the applicable separation minimum.

5.4.2.7 LONGITUDINAL SEPARATION MINIMA BASED ON DISTANCE
USING ADS-B IN-TRAIL PROCEDURE (ITP)

Note 1.— Attention is drawn to Circular 325, In-Trail Procedure (ITP) Using Automatic Dependent Surveillance — Broadcast (ADS-B).

Note 2.— Guidance material on ITP equipment can be found in RTCA DO-312/EUROCAE ED-159 Safety Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application and Supplement and RTCA DO-317A/EUROCAE ED-194, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Application (ASA) System.

5.4.2.7.1 The routes or airspace where application of the in-trail procedure is authorized, and the procedures to be followed by pilots in accordance with the provisions of Section 5.4.2.7, shall be promulgated in aeronautical information publications (AIPs).

5.4.2.7.2 ITP requests and clearances shall be communicated via a CPDLC message exchange only and in accordance with the appropriate message elements in Appendix 5.

5.4.2.7.3 Longitudinal separation between a climbing or descending ITP aircraft and reference aircraft shall be applied in accordance with 5.4.2.7.3.1, 5.4.2.7.3.2 and 5.4.2.7.3.3. An ITP aircraft shall not be separated simultaneously from more than two reference aircraft using the ITP separation minimum (see Figure 5-29).

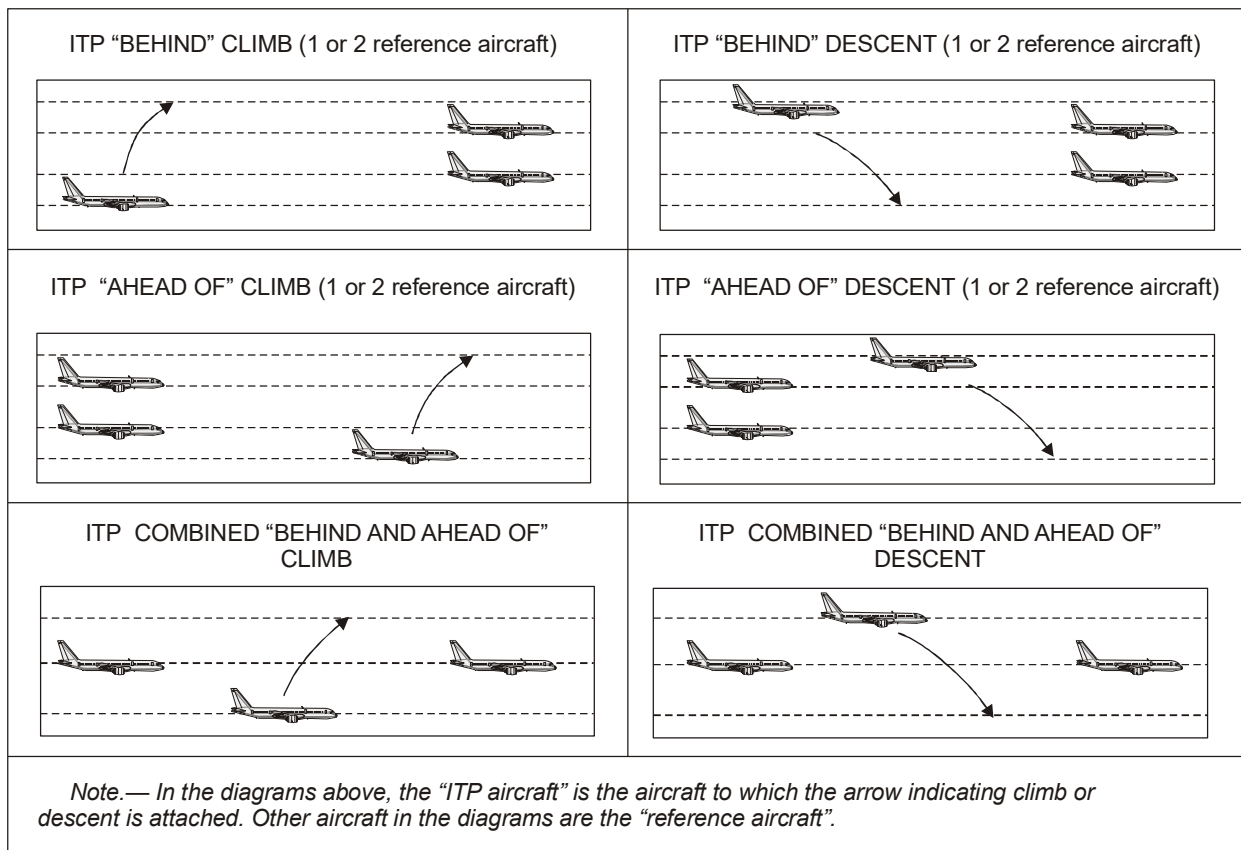


Figure 5-29. ITP flight level change scenarios (see 5.4.2.7.3)

5.4.2.7.3.1 An ITP climb or descent may be requested by the pilot provided the following ITP criteria are satisfied:

- a) the ITP distance between the ITP aircraft and the reference aircraft shall be:
 - 1) not less than 28 km (15 NM) with a maximum closing ground speed of 37 km/h (20 kt); or
 - 2) not less than 37 km (20 NM) with a maximum closing ground speed of 56 km/h (30 kt);
- b) the ITP on-board equipment shall indicate that the angle between the current tracks of the ITP aircraft and reference aircraft is less than 45 degrees;
- c) the altitude difference between the ITP aircraft and any reference aircraft shall be 600 m (2 000 ft) or less;
- d) the climb or descent shall be conducted at a rate of not less than 1.5 m/s (300 ft/min), or any higher rate when specified by the controller; and
- e) the climb or descent shall be performed at the assigned Mach number. If no Mach number has been assigned by ATC, the ITP aircraft shall maintain the current cruise Mach number throughout the ITP manoeuvre.

Note.— These criteria are designed to ensure a minimum separation of 19 km (10 NM) between the ITP aircraft and the reference aircraft during the climb or descent.

5.4.2.7.3.2 A controller may clear an aircraft for an ITP climb or descent provided the following conditions are satisfied:

- a) the ITP climb or descent has been requested by the pilot;
- b) the aircraft identification of each reference aircraft in the ITP request exactly matches the Item 7 — aircraft identification of the corresponding aircraft's filed flight plan;
- c) the reported ITP distance between the ITP aircraft and any reference aircraft is 28 km (15 NM) or more;
- d) both the ITP aircraft and reference aircraft are either on;
 - 1) same identical tracks and any turn at a waypoint shall be limited to less than 45 degrees; or
 - 2) parallel tracks or same tracks with no turns permitted during the manoeuvre.

Note.— Same identical tracks are a special case of same track defined in 5.4.2.1.5 a) where the angular difference is zero degrees.

- e) no speed or route change clearance shall be issued to the ITP aircraft until the ITP climb or descent is completed;
- f) the altitude difference between the ITP aircraft and any reference aircraft shall be 600 m (2 000 ft) or less;
- g) no instruction to amend speed, altitude or route shall be issued to any reference aircraft until the ITP climb or descent is completed;
- h) the maximum closing speed between the ITP aircraft and each reference aircraft shall be Mach 0.06; and
- i) the ITP aircraft shall not be a reference aircraft in another ITP clearance.

5.4.2.7.3.3 Following receipt of an ITP climb or descent clearance and before initiating the procedure, the pilot of the ITP aircraft shall determine that the ITP criteria referred to in 5.4.2.7.3.1 a) and b) are still being met with respect to the reference aircraft identified in the clearance and:

- a) if the ITP criteria are satisfied, the pilot shall accept the clearance and commence the climb or descent immediately; or
- b) if the ITP criteria are no longer satisfied, the pilot shall notify the controller and maintain the previously cleared level.

5.4.2.8 LONGITUDINAL SEPARATION MINIMA BASED ON DISTANCE USING ADS-C CLIMB AND DESCEND PROCEDURE (CDP)

5.4.2.8.1 When an aircraft on the same track is cleared to climb or descend through the level of another aircraft, the clearance should be issued provided the following requirements are met:

- a) the longitudinal distance between the aircraft is determined by the ground automation system from near-simultaneous demand ADS-C reports which contain position accuracy of 0.25 NM or better (Figure of Merit 6 or higher);

Note.— Refer to 5.4.2.9.5 for distance calculations.

- b) the longitudinal distance between the aircraft, as determined in a) above, is not less than:
 - 1) 27.8 km (15 NM) when the preceding aircraft is at the same speed or faster than the following aircraft; or
 - 2) 46.3 km (25 NM) when the following aircraft is not more than either 18.5 km/h (10 kt) or Mach 0.02 faster than the preceding aircraft;
- c) the altitude difference between aircraft is not greater than 600 m (2 000 ft);
- d) the clearance is issued with a restriction that ensures vertical separation is re-established within 15 minutes from the first demand report request; and
- e) direct controller-pilot voice communications or CPDLC is maintained.

5.4.2.8.2 The application of the ADS-C climb and descend procedure (CDP) should be supported by an ongoing monitoring process.

Note.— Supporting information on ongoing monitoring is provided in Circular 342, Automatic Dependent Surveillance — Contract (ADS-C) Climb and Descend Procedure (CDP).

5.4.2.9 PERFORMANCE-BASED LONGITUDINAL SEPARATION MINIMA

Note.— Guidance material for implementation and application of the separation minima in this section is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869), the Global Operational Data Link (GOLD) Manual (Doc 10037), the Satellite Voice Operations Manual (SVOM) (Doc 10038) and the Manual on the Implementation of Performance-based Longitudinal Separation Minima (Doc 10120), and the Manual on Monitoring the Application of Performance-Based Horizontal Separation Minima (Doc 10063).

5.4.2.9.1 Within designated airspace, or on designated routes, separation minima in accordance with the provisions of this section may be used.

5.4.2.9.2 The following separation minima may be used for aircraft cruising, climbing or descending on:

- a) the same track; or
- b) crossing tracks, provided that the relative angle between the tracks is less than 90 degrees.

<i>Separation minima</i>	<i>RNP</i>	<i>RCP</i>	<i>RSP</i>	<i>Maximum ADS-C periodic reporting interval</i>
93 km (50 NM)	10	240	180	27 minutes
	4	240	180	32 minutes
55.5 km (30 NM)	2 or 4	240	180	12 minutes
37 km (20 NM)	2 or 4	240	180	192 seconds (3.2 minutes)
5 minutes	2 or 4 or 10	240	180	14 minutes

Note.— The 192 seconds (3.2 minutes) maximum ADS-C periodic reporting interval is intended for use during application of the 37 km (20 NM) separation minimum between specific aircraft pairs and is not intended for use as a default periodic reporting interval for all aircraft. Attention is drawn to the guidance regarding ADS contract – periodic in the Global Operational Data Link (GOLD) Manual (Doc 10037).

5.4.2.9.3 Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided that ADS-C reports show that the aircraft have passed each other by the applicable separation minimum in 5.4.2.9.2.

5.4.2.9.4 The five-minute separation shall be calculated to a resolution of one second without rounding.

5.4.2.9.5 Separation shall be applied so that the distance or time between the calculated positions of the aircraft is never less than the prescribed minimum. This distance or time shall be obtained by one of the following methods:

- a) when the aircraft are on the same identical track, the distance or time may be measured between the calculated positions of the aircraft or may be calculated by measuring the distances or times to a common point on the track (see Figures 5-30 and 5-31);

Note.— Same identical tracks are a special case of same track defined in 5.4.2.1.5 a) where the angular difference is zero degrees or reciprocal tracks defined in 5.4.2.1.5 b) where the angular difference is 180 degrees.

- b) when the aircraft are on the same or reciprocal non-parallel tracks other than in a) above, or on crossing tracks, the distance or time shall be calculated by measuring the distances or times to the common point of intersection of the tracks or projected track (see Figures 5-32 to 5-34); and
- c) when the aircraft are on parallel tracks whose protection areas overlap, the distance or time shall be measured along the track of one of the aircraft, as in a) above, using its calculated position and the point abeam the calculated position of the other aircraft (see Figure 5-35).

Note.— In all cases presented in Figures 5-30 to 5-35, “d” and “t” are calculated by subtracting the distance or time of the closer aircraft from the common point from the distance or time of the more distant aircraft from the common point, except in Figure 5-34 where the two distances or times are added and the order of the aircraft is not important in the calculation.

5.4.2.9.6 The communication system provided to enable the application of the separation minima in 5.4.2.9.2 shall allow a controller, within 4 minutes, to intervene and resolve a potential conflict by contacting an aircraft using the normal means of communication. An alternative means shall be available to allow the controller to intervene and resolve the conflict within a total time of 10.5 minutes, should the normal means of communication fail.

5.4.2.9.7 When an ADS-C periodic or waypoint change event report is not received within 3 minutes of the time it should have been sent, the report is considered overdue and the controller shall take action to obtain the report as quickly as possible, normally by ADS-C or CPDLC. If a report is not received within 6 minutes of the time the original report should have been sent, and there is a possibility of loss of separation with other aircraft, the controller shall take action to resolve any potential conflict(s) as soon as possible. The communication means provided shall be such that the conflict is resolved within a further 7.5 minutes.

5.4.2.9.8 When information is received indicating ground or aircraft equipment failure or deterioration below the communication, navigation and surveillance performance requirements, ATC shall then, as required, apply alternative separation minima.

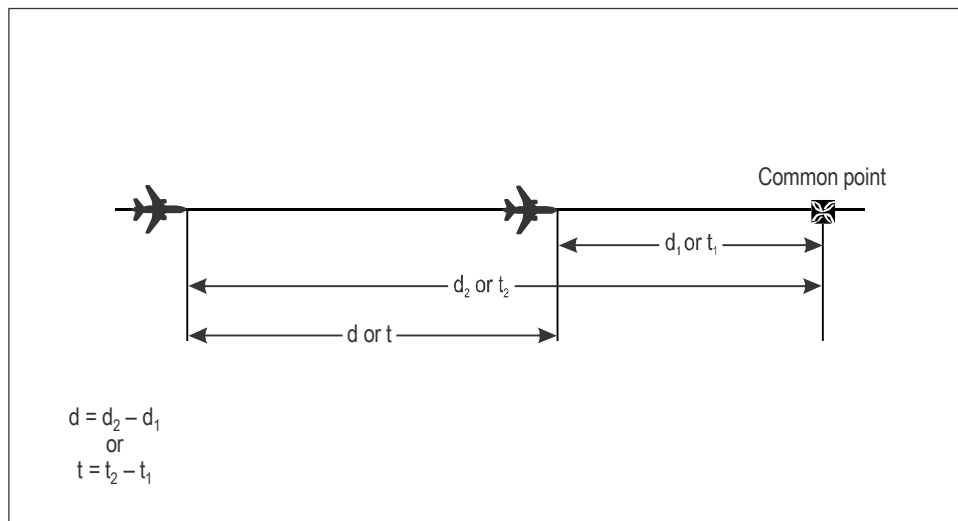


Figure 5-30. Calculation of longitudinal distance/time between aircraft — identical track, same direction (see 5.4.2.9.5 a))

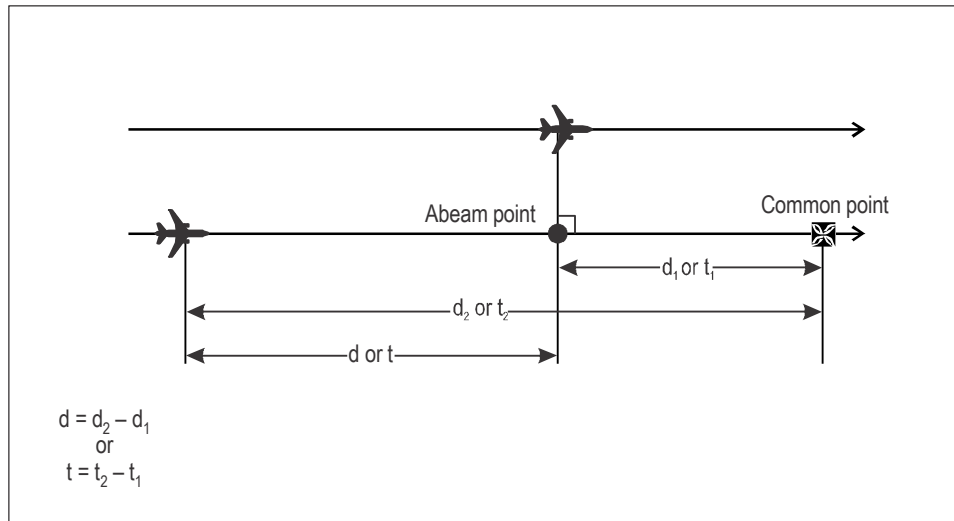


Figure 5-35. Calculation of longitudinal distance/time between aircraft — parallel tracks (see 5.4.2.9.5 c))

5.5 SEPARATION OF AIRCRAFT HOLDING IN FLIGHT

5.5.1 Aircraft established in adjacent holding patterns shall, except when lateral separation between the holding areas exists as determined by the appropriate ATS authority, be separated by the applicable vertical separation minimum.

5.5.2 Except when lateral separation exists, vertical separation shall be applied between aircraft holding in flight and other aircraft, whether arriving, departing or en route, whenever the other aircraft concerned are within five minutes flying time of the holding area or within a distance prescribed by the appropriate authority (see Figure 5-36).

5.6 MINIMUM SEPARATION BETWEEN DEPARTING AIRCRAFT

Note.— The following provisions are complementary to the longitudinal separation minima specified in Section 5.4.2.

5.6.1 One-minute separation is required if aircraft are to fly on tracks diverging by at least 45 degrees immediately after take-off so that lateral separation is provided (see Figure 5-37). This minimum may be reduced when aircraft are using parallel runways or when the procedure in Chapter 6, 6.3.3.1, is adopted for operations on diverging runways which do not cross, provided instructions covering the procedure have been approved by the appropriate ATS authority and lateral separation is effected immediately after take-off.

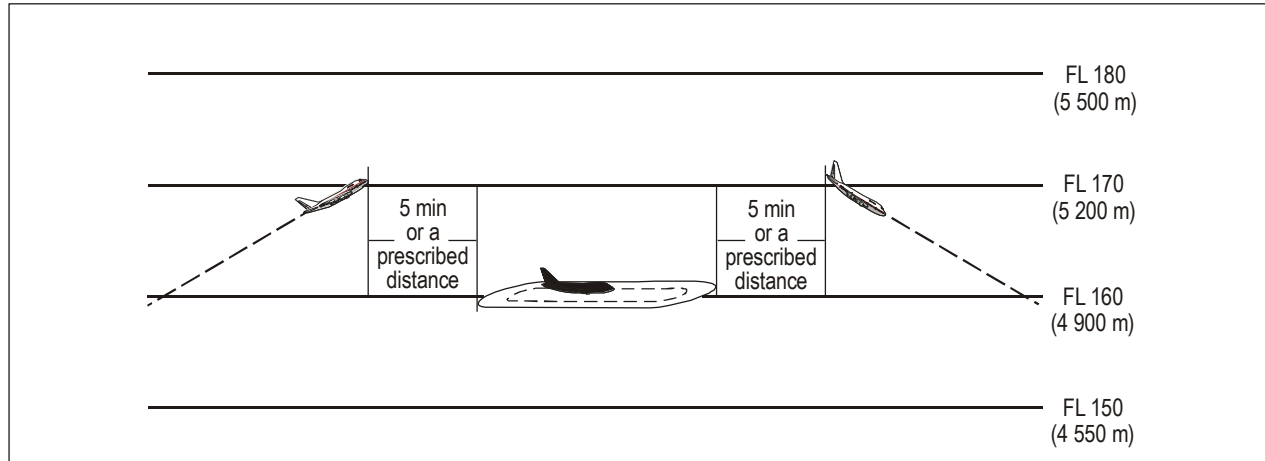


Figure 5-36. Separation between holding aircraft and en-route aircraft (see 5.5.2)

Note 1.— Wake turbulence categories and groups are contained in Chapter 4, Section 4.9.1 and longitudinal separation minima are contained in Chapter 5, Section 5.8 and in Chapter 8, Section 8.7.3.

Note 2.— Detailed characteristics of wake vortices and their effect on aircraft are contained in the Air Traffic Services Planning Manual (Doc 9426), Part II, Section 5.

5.6.2 Two minutes are required between take-offs when the preceding aircraft is 74 km/h (40 kt) or more faster than the following aircraft and both aircraft will follow the same track (see Figure 5-38).

Note.— See Chapter 4, Section 4.6, concerning speed control instructions. Calculations, based on TAS, of speed differentials of aircraft during climb may not be sufficiently accurate in all circumstances for determining if the procedure in 5.6.2 can be applied, in which case calculations based on IAS may be more suitable.

5.6.3 Five-minute separation is required while vertical separation does not exist if a departing aircraft will be flown through the level of a preceding departing aircraft and both aircraft propose to follow the same track (see Figure 5-39). Action must be taken to ensure that the five-minute separation will be maintained or increased while vertical separation does not exist.

5.7 SEPARATION OF DEPARTING AIRCRAFT FROM ARRIVING AIRCRAFT

5.7.1 Except as otherwise prescribed by the appropriate ATS authority, the following separation shall be applied when take-off clearance is based on the position of an arriving aircraft.

5.7.1.1 If an arriving aircraft is making a complete instrument approach, a departing aircraft may take off:

- a) in any direction until an arriving aircraft has started its procedure turn or base turn leading to final approach;
- b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after the arriving aircraft has started procedure turn or base turn leading to final approach, provided that the take-off will be made at least 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway (see Figure 5-40).

Note.— The arrival protection area is defined as the shaded area extending from a line 45 degrees from an established compulsory reporting waypoint to a line 45 degrees from the outermost edge of the remainder of the arrival and/or approach procedure (see Figure 5-41).

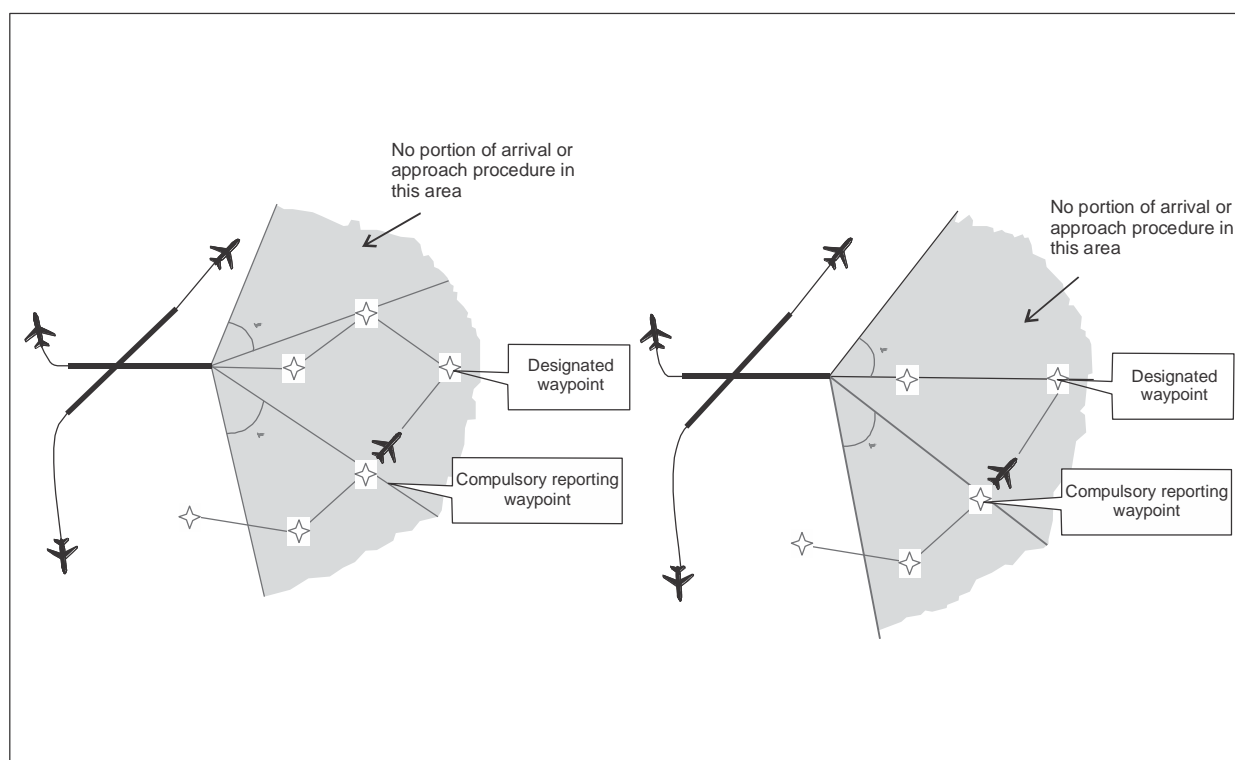


Figure 5-41. Examples of arrival protection area

5.8 TIME-BASED WAKE TURBULENCE LONGITUDINAL SEPARATION MINIMA

Note.— Distance-based wake turbulence separation minima are set forth in Chapter 8, 8.7.3.

5.8.1 Applicability

5.8.1.1 The ATC unit concerned shall not be required to apply wake turbulence separation:

- a) for arriving VFR flights landing on the same runway as a preceding landing SUPER, HEAVY or MEDIUM aircraft; and
- b) between arriving IFR flights executing visual approach when the aircraft has reported the preceding aircraft in sight and has been instructed to follow and maintain own separation from that aircraft.

5.8.1.2 The ATC unit shall, in respect of the flights specified in 5.8.1.1 a) and b), as well as when otherwise deemed necessary, issue a caution of possible wake turbulence. The pilot-in-command of the aircraft concerned shall be 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 shall inform the ATC unit accordingly, stating their requirements.

5.8.2 Arriving aircraft

5.8.2.1 Except as provided for in 5.8.1.1 a) and b), the following minima shall be applied to aircraft landing behind a SUPER, a HEAVY or a MEDIUM aircraft:

- a) HEAVY aircraft landing behind SUPER aircraft — 2 minutes;
- b) MEDIUM aircraft landing behind SUPER aircraft — 3 minutes;
- c) MEDIUM aircraft landing behind HEAVY aircraft — 2 minutes;
- d) LIGHT aircraft landing behind SUPER aircraft — 4 minutes;
- e) LIGHT aircraft landing behind a HEAVY or MEDIUM aircraft — 3 minutes.

5.8.3 Departing aircraft

5.8.3.1 When using wake turbulence categories contained in Chapter 4, 4.9.1.1 and when the aircraft are using:

- a) the same runway (see Figure 5-42);
- b) parallel runways separated by less than 760 m (2 500 ft) (see Figure 5-42);
- c) crossing runways if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 300 m (1 000 ft) below (see Figure 5-43);
- d) parallel runways separated by 760 m (2 500 ft) or more, if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 300 m (1 000 ft) below (see Figure 5-43).

the following minimum separations shall be applied:

- 1) HEAVY aircraft taking off behind a SUPER aircraft — 2 minutes;
- 2) LIGHT or MEDIUM aircraft taking off behind a SUPER aircraft — 3 minutes;
- 3) LIGHT or MEDIUM aircraft taking off behind a HEAVY aircraft — 2 minutes;
- 4) LIGHT aircraft taking off behind a MEDIUM aircraft — 2 minutes.

5.8.3.2 When using wake turbulence groups contained in Chapter 4, 4.9.1.2 and when the aircraft are using:

- a) the same runway (see Figure 5-42);
- b) parallel runways separated by less than 760 m (2 500 ft) (see Figure 5-42);
- c) crossing runways if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 300 m (1 000 ft) below (see Figure 5-43);
- d) parallel runways separated by 760 m (2 500 ft) or more, if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 300 m (1 000 ft) below (see Figure 5-43);

the following separations shall be applied:

<i>Preceding aircraft wake turbulence group</i>	<i>Succeeding aircraft wake turbulence group</i>	<i>Time-based wake turbulence separation minima</i>
A	B C D E F G	100 seconds 120 seconds 140 seconds 160 seconds 160 seconds 180 seconds
B	D E F G	100 seconds 120 seconds 120 seconds 140 seconds
C	D E F G	80 seconds 100 seconds 100 seconds 120 seconds
D	G	120 seconds
E	G	100 seconds

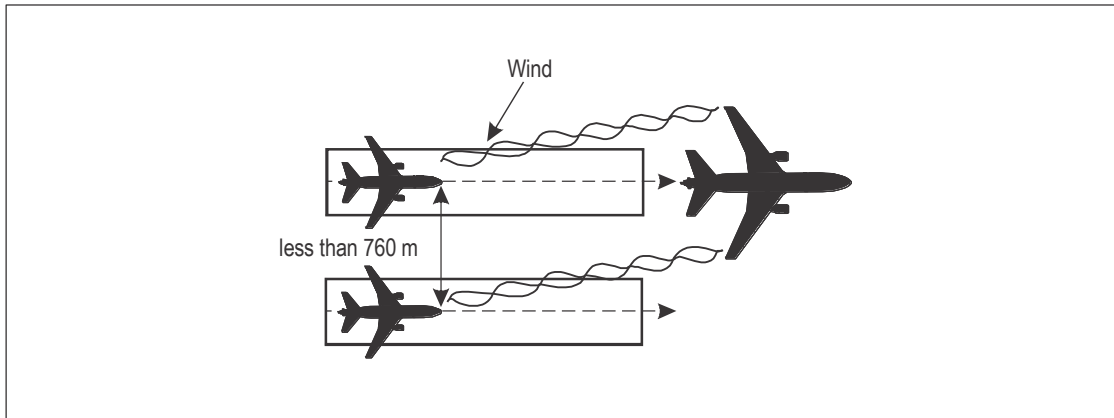
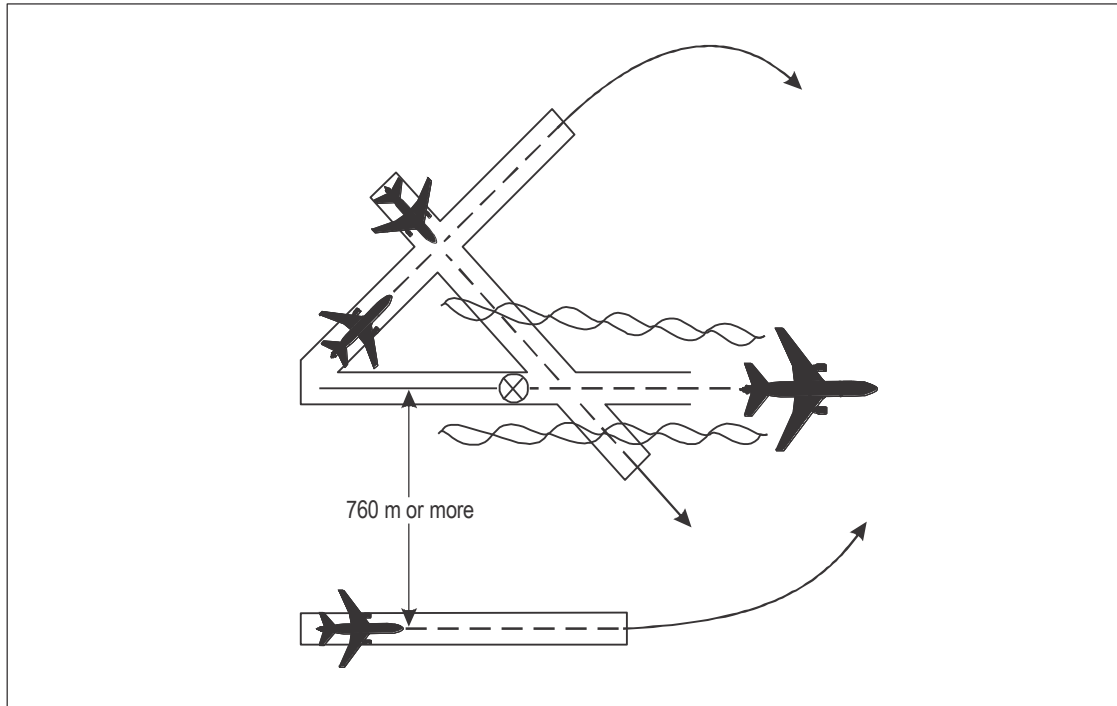


Figure 5-42. Wake turbulence separation for following aircraft
(see 5.8.3.1 a) and b) and 5.8.3.2 a) and b))



**Figure 5-43. Wake turbulence separation for crossing aircraft
(see 5.8.3.1 c) and d) and 5.8.3.2 c) and d))**

5.8.3.3 When using wake turbulence categories contained in Chapter 4, 4.9.1.1 for aircraft taking off from an intermediate part of the same runway or an intermediate part of a parallel runway separated by less than 760 m (2 500 ft) (see Figure 5-44), the following minimum separations shall be applied:

- a) HEAVY aircraft taking off behind a SUPER aircraft — 3 minutes;
- b) LIGHT or MEDIUM aircraft taking off behind a SUPER aircraft — 4 minutes;
- c) LIGHT or MEDIUM aircraft taking off behind a HEAVY aircraft — 3 minutes;
- d) LIGHT aircraft taking off behind a MEDIUM aircraft — 3 minutes.

5.8.3.4 When applying the wake turbulence groups in Chapter 4, 4.9.1.2 for aircraft taking off from an intermediate part of the same runway or an intermediate part of a parallel runway separated by less than 760 m (2 500 ft) (see Figure 5-44), the following minimum separations shall be applied:

<i>Preceding aircraft wake turbulence group</i>	<i>Succeeding aircraft wake turbulence group</i>	<i>Time-based wake turbulence separation minima</i>
A	B C D E F G	160 seconds 180 seconds 200 seconds 220 seconds 220 seconds 240 seconds
B	D E F G	160 seconds 180 seconds 180 seconds 200 seconds
C	D E F G	140 seconds 160 seconds 160 seconds 180 seconds
D	G	180 seconds
E	G	160 seconds

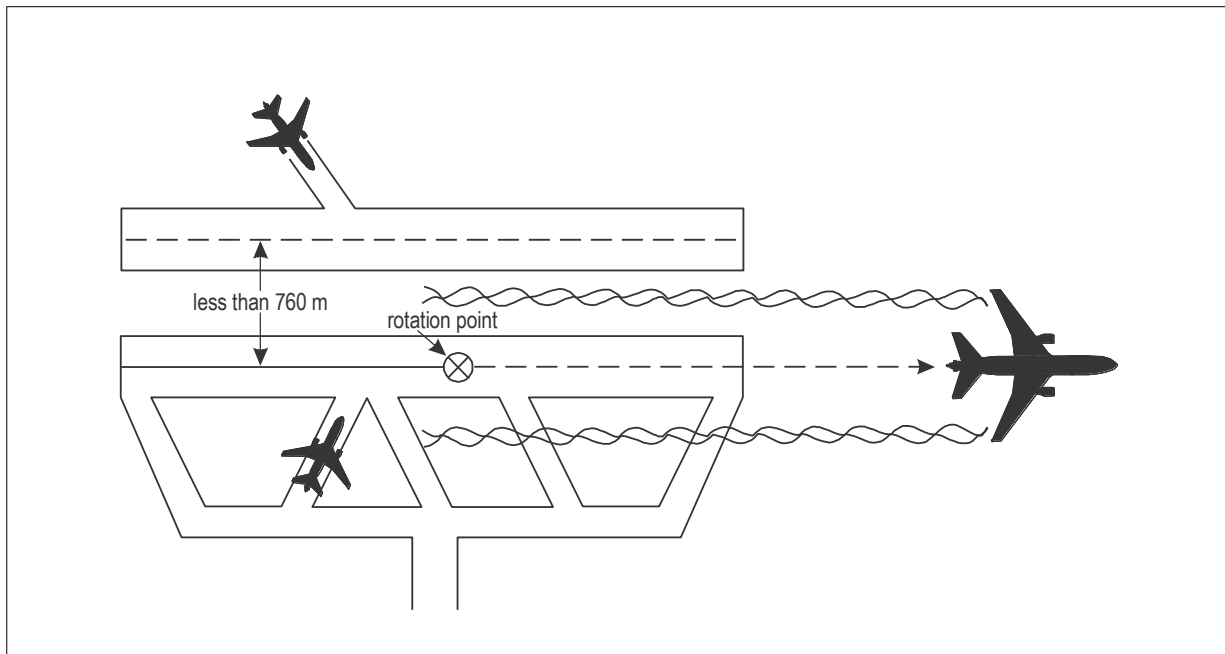


Figure 5-44. Wake turbulence separation for following aircraft
(see 5.8.3.3 and 5.8.3.4)

5.8.4 Displaced landing threshold

5.8.4.1 When using wake turbulence categories contained in Chapter 4, 4.9.1.1 and when operating a displaced landing threshold, the following minimum separations shall be applied if the projected flight paths are expected to cross:

- a) a departing HEAVY aircraft following a SUPER aircraft arrival — 2 minutes;
- b) a departing LIGHT or MEDIUM aircraft following a SUPER aircraft arrival — 3 minutes;
- c) a departing LIGHT or MEDIUM aircraft following a HEAVY aircraft arrival — 2 minutes;
- d) a departing LIGHT aircraft following a MEDIUM aircraft arrival — 2 minutes;
- e) a HEAVY aircraft arrival following a SUPER aircraft departure — 2 minutes;
- f) a LIGHT or MEDIUM aircraft arrival following a SUPER aircraft departure — 3 minutes;
- g) a LIGHT or MEDIUM aircraft arrival following a HEAVY aircraft departure — 2 minutes;
- h) a LIGHT aircraft arrival following a MEDIUM aircraft departure — 2 minutes.

5.8.4.2 When using wake turbulence groups contained in Chapter 4, 4.9.1.2 and when operating a displaced landing threshold, the following minimum separations shall be applied when a departing aircraft follows an arriving aircraft, if the projected flight paths are expected to cross:

<i>Preceding arriving aircraft group</i>	<i>Succeeding departing aircraft group</i>	<i>Time-based wake turbulence separation minima</i>
A	B	100 seconds
	C	120 seconds
	D	140 seconds
	E	160 seconds
	F	160 seconds
	G	180 seconds
	B	D
E		120 seconds
F		120 seconds
G		140 seconds
C	D	80 seconds
	E	100 seconds
	F	100 seconds
	G	120 seconds
D	G	120 seconds
E	G	100 seconds

5.8.4.3 When using wake turbulence groups contained in Chapter 4, 4.9.1.2 and when operating a displaced landing threshold, the following minimum separations shall be applied when an arriving aircraft follows a departing aircraft, if their projected flight paths are expected to cross:

<i>Preceding departing aircraft group</i>	<i>Succeeding arriving aircraft group</i>	<i>Time-based wake turbulence separation minima</i>
A	B C D E F G	100 seconds 120 seconds 140 seconds 160 seconds 160 seconds 180 seconds
B	D E F G	100 seconds 120 seconds 120 seconds 140 seconds
C	D E F G	80 seconds 100 seconds 100 seconds 120 seconds
D	G	120 seconds
E	G	100 seconds

5.8.5 Opposite direction

5.8.5.1 When using wake turbulence categories contained in Chapter 4, 4.9.1.1 for a heavier aircraft making a low or missed approach and when the lighter aircraft is:

- a) using an opposite-direction runway for take-off (see Figure 5-45); or
- b) landing on the same runway in the opposite direction, or on a parallel opposite-direction runway separated by less than 760 m (2 500 ft) (see Figure 5-46);

the following minimum separations shall be used:

- 1) between a HEAVY aircraft and a SUPER aircraft — 3 minutes;
- 2) between a LIGHT or MEDIUM aircraft and a SUPER aircraft — 4 minutes;
- 3) between a LIGHT or MEDIUM aircraft and a HEAVY aircraft — 3 minutes;
- 4) between a LIGHT aircraft and a MEDIUM aircraft — 3 minutes.

5.8.5.2 When applying the wake turbulence groups in Chapter 4, 4.9.1.2 and a heavier aircraft is making a low or missed approach and the lighter aircraft is:

- a) utilizing an opposite-direction runway for take-off (see Figure 5-45); or
- b) landing on the same runway in the opposite direction, or on a parallel opposite-direction runway separated by less than 760 m (2 500 ft) (see Figure 5-46),

the following minimum separations shall be used:

<i>Preceding aircraft group</i>	<i>Succeeding aircraft group</i>	<i>Time-based wake turbulence separation minima</i>
A	B C D E F G	160 seconds 180 seconds 200 seconds 220 seconds 220 seconds 240 seconds
B	D E F G	160 seconds 180 seconds 180 seconds 200 seconds
C	D E F G	140 seconds 160 seconds 160 seconds 180 seconds
D	G	180 seconds
E	G	160 seconds

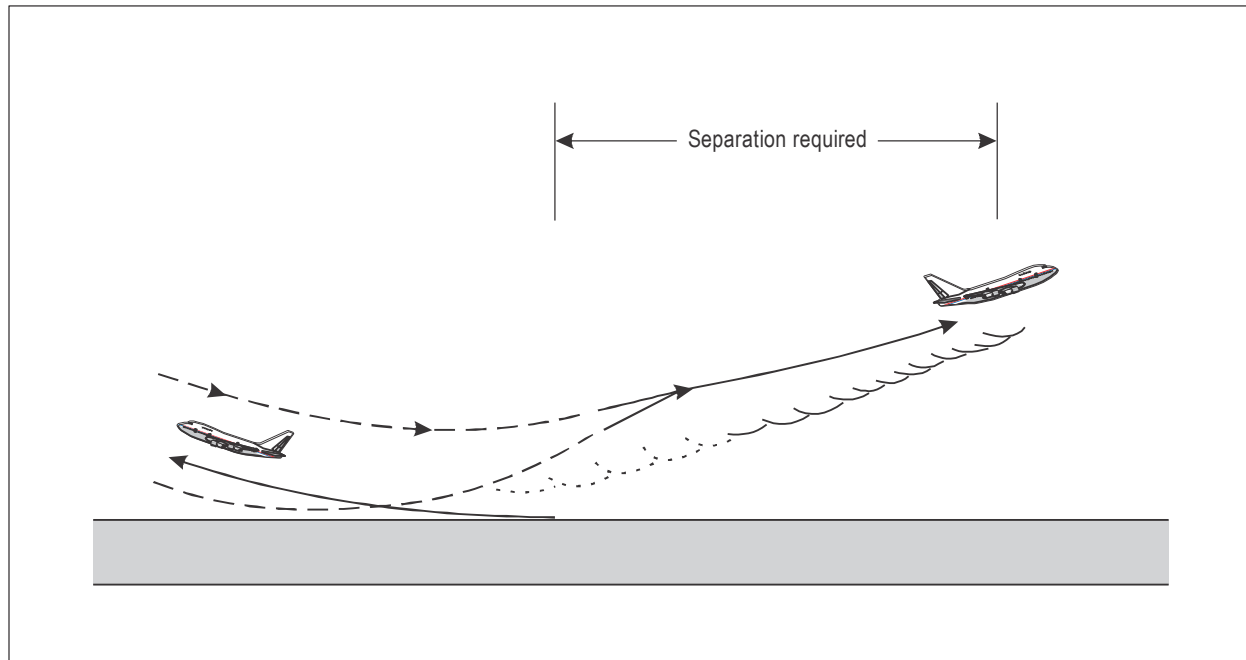


Figure 5-45. Wake turbulence separation for opposite-direction take-off
(see 5.8.5.1 a) and 5.8.5.2 a))

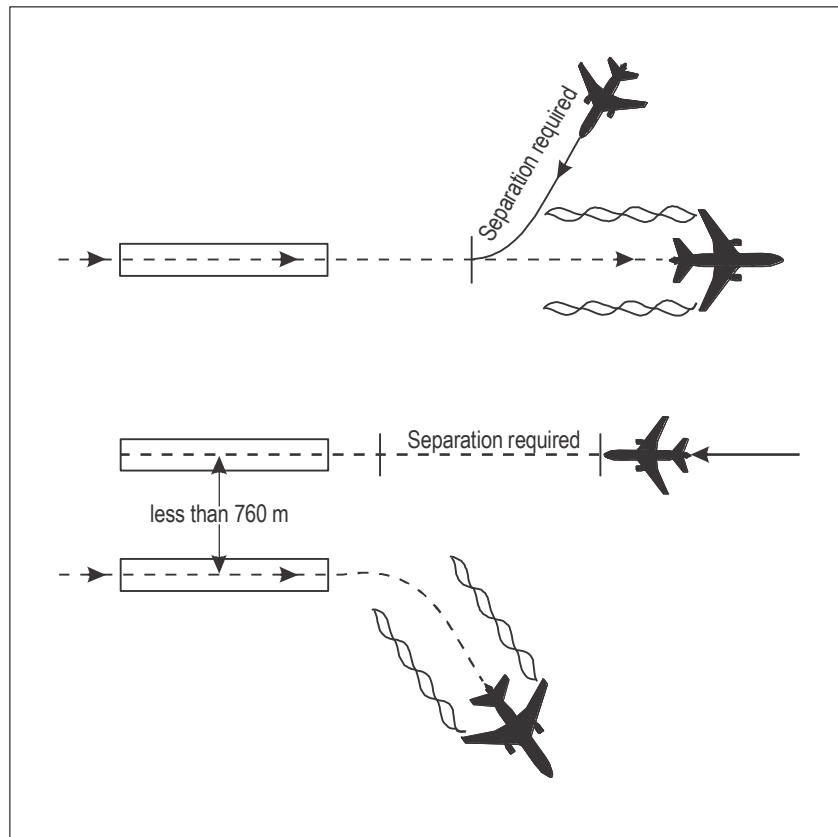


Figure 5-46. Wake turbulence separation for opposite-direction landing (see 5.8.5.1 b) and 5.8.5.2 b))

5.9 CLEARANCES TO FLY MAINTAINING OWN SEPARATION WHILE IN VISUAL METEOROLOGICAL CONDITIONS

Note 1.— As indicated in this Section, the provision of vertical or horizontal separation by an air traffic control unit is not applicable in respect of any specified portion of a flight cleared subject to maintaining own separation and remaining in visual meteorological conditions. It is for the flight so cleared to ensure, for the duration of the clearance, that it is not operated in such proximity to other flights as to create a collision hazard.

Note 2.— It is axiomatic that a VFR flight must remain in visual meteorological conditions at all times. Accordingly, the issuance of a clearance to a VFR flight to fly subject to maintaining own separation and remaining in visual meteorological conditions has no other object than to signify that, for the duration of the clearance, separation from other aircraft by air traffic control is not provided.

Note 3.— The objectives of the air traffic control service as prescribed in Annex 11 do not include prevention of collision with terrain. The procedures prescribed in this document do not relieve pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in this respect. When an IFR flight is vectored or is given a direct routing which takes the aircraft off an ATS route, the procedures in Chapter 8, 8.6.5.2 apply.

When so requested by an aircraft and provided it is agreed by the pilot of the other aircraft and so authorized by the appropriate ATS authority, an ATC unit may clear a controlled flight, including departing and arriving flights, operating in airspace Classes D and E in visual meteorological conditions during the hours of daylight to fly subject to maintaining own separation to one other aircraft and remaining in visual meteorological conditions. When a controlled flight is so cleared, the following shall apply:

- a) the clearance shall be for a specified portion of the flight at or below 3 050 m (10 000 ft), during climb or descent and subject to further restrictions as and when prescribed on the basis of regional air navigation agreements;
- b) if there is a possibility that flight under visual meteorological conditions may become impracticable, an IFR flight shall be provided with alternative instructions to be complied with in the event that flight in visual meteorological conditions (VMC) cannot be maintained for the term of the clearance;
- c) the pilot of an IFR flight, on observing that conditions are deteriorating and considering that operation in VMC will become impossible, shall inform ATC before entering instrument meteorological conditions (IMC) and shall proceed in accordance with the alternative instructions given.

Note.— See also 5.10.1.2.

5.10 ESSENTIAL TRAFFIC INFORMATION

5.10.1 General

5.10.1.1 Essential traffic is that controlled traffic to which the provision of separation by ATC is applicable, but which, in relation to a particular controlled flight is not, or will not be, separated from other controlled traffic by the appropriate separation minimum.

Note.— Pursuant to Section 5.2, but subject to certain exceptions stated therein, ATC is required to provide separation between IFR flights in airspace Classes A to E, and between IFR and VFR flights in Classes B and C. ATC is not required to provide separation between VFR flights, except within airspace Class B. Therefore, IFR or VFR flights may constitute essential traffic to IFR traffic, and IFR flights may constitute essential traffic to VFR traffic. However, a VFR flight would not constitute essential traffic to other VFR flights except within Class B airspace.

5.10.1.2 Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other.

Note.— This information will inevitably relate to controlled flights cleared subject to maintaining own separation and remaining in visual meteorological conditions and also whenever the intended separation minimum has been infringed.

5.10.2 Information to be provided

Essential traffic information shall include:

- a) direction of flight of aircraft concerned;
- b) type and wake turbulence category (if relevant) of aircraft concerned;
- c) cruising level of aircraft concerned; and
 - 1) estimated time over the reporting point nearest to where the level will be crossed; or

- 2) relative bearing of the aircraft concerned in terms of the 12-hour clock as well as distance from the conflicting traffic; or
- 3) actual or estimated position of the aircraft concerned.

Note 1.— Nothing in Section 5.10 is intended to prevent ATC from imparting to aircraft under its control any other information at its disposal with a view to enhancing air safety in accordance with the objectives of ATS as defined in Chapter 2 of Annex 11.

Note 2.— Wake turbulence category will only be essential traffic information if the aircraft concerned is of a heavier wake turbulence category than the aircraft to which the traffic information is directed.

5.11 REDUCTION IN SEPARATION MINIMA

Note.— See also Chapter 2, ATS Safety Management.

5.11.1 Provided an appropriate safety risk assessment has shown that an acceptable level of safety will be maintained, and after prior consultation with users, the separation minima detailed in 5.4.1 and 5.4.2 may be reduced in the following circumstances:

5.11.1.1 As determined by the appropriate ATS authority as appropriate:

- a) when special electronic or other aids enable the pilot-in-command of an aircraft to determine accurately the aircraft's position and when adequate communication facilities exist for that position to be transmitted without delay to the appropriate air traffic control unit; or
- b) when, in association with rapid and reliable communication facilities, information of an aircraft's position, derived from an ATS surveillance system, is available to the appropriate air traffic control unit; or
- c) when special electronic or other aids enable the air traffic controller to predict rapidly and accurately the flight paths of aircraft, and adequate facilities exist to verify frequently the actual aircraft positions with the predicted positions; or
- d) when RNAV-equipped aircraft operate within the coverage of electronic aids that provide the necessary updates to maintain navigation accuracy.

5.11.1.2 In accordance with regional air navigation agreements when:

- a) special electronic, area navigation or other aids enable the aircraft to closely adhere to their current flight plans; and
- b) the air traffic situation is such that the conditions in 5.11.1.1 a) regarding communications between pilots and the appropriate ATC unit or units need not necessarily be met to the degree specified therein.

Note.— Attention is drawn to the guidance material contained in the Air Traffic Services Planning Manual (Doc 9426) regarding conditions governing the reduction of separation minima and to the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

- d) ATS operational procedures ensure that the required track divergence is achieved.

Note.— For further details refer to Circular 350, Guidelines for the Implementation of Reduced Divergence Departures.

6.7.3 Arriving aircraft

6.7.3.1 TYPES OF OPERATIONS

6.7.3.1.1 Parallel runways may be used for simultaneous instrument operations for:

- a) independent parallel approaches; or
- b) dependent parallel approaches; or
- c) segregated parallel operations.

6.7.3.1.2 Whenever parallel approaches are carried out, separate controllers should be responsible for the sequencing and spacing of arriving aircraft to each runway.

6.7.3.2 REQUIREMENTS AND PROCEDURES FOR INDEPENDENT PARALLEL APPROACHES

6.7.3.2.1 Independent parallel approaches may be conducted to parallel runways provided that:

- a) the runway centre lines are spaced by the distance specified in Table 6-1 (see Annex 14, Volume I) and the surveillance criteria contained in Table 6-1 are met;

Table 6-1. ATS surveillance system criteria for different runway spacings

<i>Runway centre line spacing</i>	<i>ATS surveillance system criteria</i>
Less than 1 310 m (4 300 ft) but not less than 1 035 m (3 400 ft)	<ul style="list-style-type: none"> a) a minimum accuracy for an ATS surveillance system as follows: <ul style="list-style-type: none"> 1) for SSR, an azimuth accuracy of 0.06 degrees (one sigma); or 2) for MLAT or ADS-B, an accuracy of 30 m (100 ft); b) an update period of 2.5 seconds or less; and c) a high resolution display providing position prediction and deviation alert is available.
Less than 1 525 m (5 000 ft) but not less than 1 310 m (4 300 ft)	<ul style="list-style-type: none"> a) an ATS surveillance system with performance specifications other than those above, but equal to or better than: <ul style="list-style-type: none"> 1) for SSR, a minimum azimuth accuracy of 0.3 degrees (one sigma); or

<i>Runway centre line spacing</i>	<i>ATS surveillance system criteria</i>
	2) for MLAT or ADS-B, a performance capability equivalent to or better than the SSR requirement can be demonstrated; b) an update period of 5 seconds or less; and c) when it is determined that the safety of aircraft operations would not be adversely affected.
1 525 m (5 000 ft) or more	a) a minimum SSR azimuth accuracy of 0.3 degrees (one sigma), or for MLAT or ADS-B, a performance capability equivalent to or better than the SSR requirement can be demonstrated; and b) an update period of 5 seconds or less.

Note 1.— Information pertaining to use of ADS-B and MLAT and their system performance is contained in the Assessment of ADS-B and Multilateration Surveillance to Support Air Traffic Services and Guidelines for Implementation (Circ 326).

Note 2.— Refer to Chapter 2, Section 2.6.2 f) on ADS-B implementation that envisages reliance upon a common source for surveillance and/or navigation.

- b) the instrument approach procedures that align the aircraft with the extended runway centre line are any combination of the following:
- 1) a precision approach procedure; or
 - 2) except as provided in 6.7.3.2.1.b) 3), an approach with vertical guidance (APV) designed using the RNP AR APCH specification where:
 - i) the RNP value for B, and the RNP value for C if that segment of the approach is within the horizontal separation minimum of a parallel approach, do not exceed one-quarter of the distance between runway centre lines (A), (Figure 6-1 refers); and
 - ii) the RNP value for B, and the RNP value for C if that part of the approach is within the horizontal separation minimum of a parallel approach, do not exceed $(A-D)/2$, (Figure 6-1 refers); or
 - 3) an APV procedure designed using either the RNP APCH or RNP AR APCH navigation specification, provided that:
 - i) an appropriate, documented safety risk assessment has shown that an acceptable level of safety can be met;
 - ii) operations are approved by the appropriate ATS authority (Note 1 refers); and
 - iii) the instrument approach is demonstrated to protect the NTZ from infringement during normal operations.

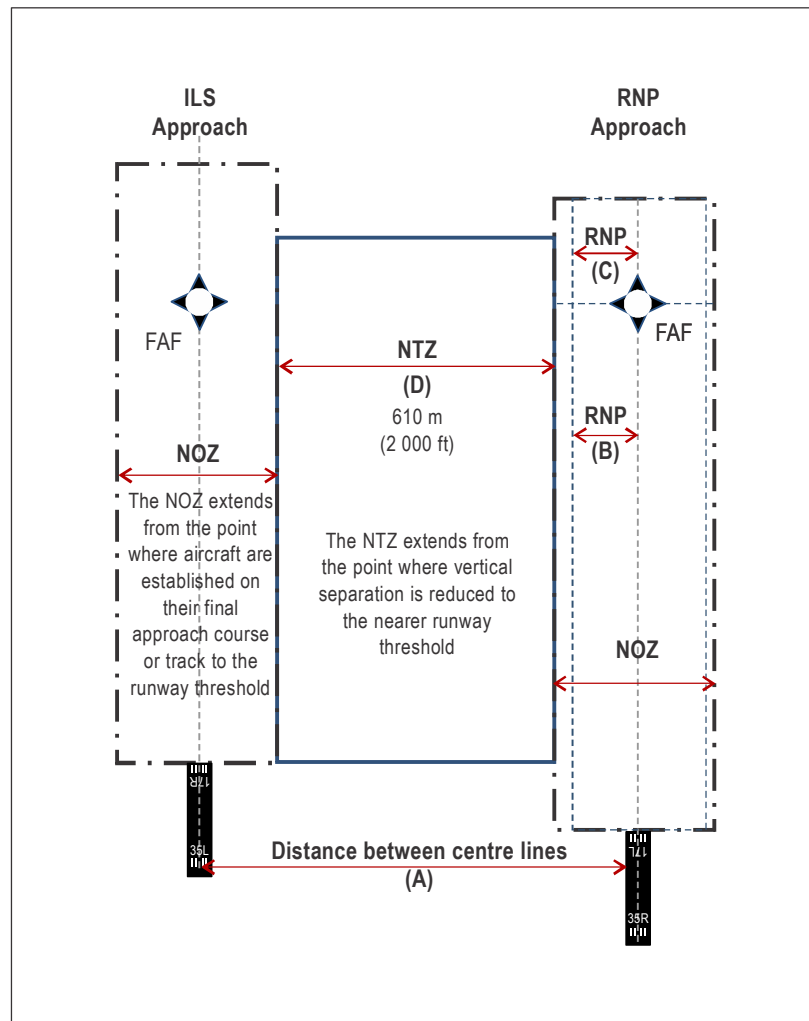


Figure 6-1. Distance between centre lines, NTZ and NOZ

Note 1.— The demonstration of the safety of an APV procedure designed using either RNP APCH or RNP AR APCH navigation specification during simultaneous approaches may consider: the collision risk from normal and residual (not mitigated) atypical errors; likelihood of ACAS nuisance alerting during normal operations; wake hazard; monitoring and available levels of system automation; database management; flight management system input and related crew workload; impacts of meteorological conditions and other environmental factors; training and published ATC break-out procedures.

Note 2.— For examples of the approach types and scenarios applicable to 6.7.3.2.1 b) see Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643), Table 2-2 and Appendix C.

- c) the nominal tracks of the missed approach procedures diverge by at least 30 degrees;
- d) an obstacle survey and evaluation is completed, as appropriate, for the areas adjacent to the final approach segments;

- e) aircraft are advised as early as possible, of the assigned runway, instrument approach procedure and any additional information considered necessary to confirm correct selection;
- f) the final approach course or track, is intercepted by use of:
 - 1) vectoring; or
 - 2) a published arrival and approach procedure that intercepts with the IAF or IF;
- g) a no transgression zone (NTZ) at least 610 m (2 000 ft) wide is established equidistant between extended runway centre lines and is depicted on the ATS surveillance system situation display;
- h) the approaches are monitored by:
 - 1) a separate monitoring controller for each runway; or
 - 2) a single monitoring controller for no more than two runways, if determined by a safety risk assessment and approved by the appropriate ATS authority (6.7.3.2.2 refers);
- i) monitoring ensures that when the 300 m (1 000 ft) vertical separation is reduced:
 - 1) aircraft do not penetrate the depicted NTZ; and
 - 2) the applicable minimum longitudinal separation between aircraft on the same final approach course or track is maintained; and
- j) if no dedicated radio channels are available for the controllers to control the aircraft until landing:
 - 1) transfer of communication of aircraft to the respective aerodrome controller's channel is effected before either of the two aircraft on adjacent final approach tracks intercepts the glide path or vertical path for the selected instrument approach procedure; and
 - 2) the controller(s) monitoring the approaches to each runway are provided with the capability to override transmissions of aerodrome control on the respective radio channels for each arrival flow.

6.7.3.2.2 States conducting safety risk assessments to enable the monitoring of not more than two runways by a single controller (6.7.3.2.1 h) refers) should review factors such as, but not limited to: complexity, times of operation, traffic mix and density, arrival rate, available levels of system automation, availability of backup systems, impacts of meteorological conditions and other environmental factors.

6.7.3.2.3 As early as practicable after an aircraft has established communication with approach control, the aircraft shall be advised that independent parallel approaches are in force. This information may be provided through the ATIS broadcasts.

6.7.3.2.4 When vectoring to intercept the final approach course or track, the final vector shall meet the following conditions:

- a) enable the aircraft to intercept at an angle not greater than 30 degrees;
- b) provide at least 1.9 km (1.0 NM) straight and level flight prior to the final approach course or track intercept; and
- c) enable the aircraft to be established on the final approach course or track, in level flight for at least 3.7 km (2.0 NM) prior to intercepting the glide path or vertical path for the selected instrument approach procedure.

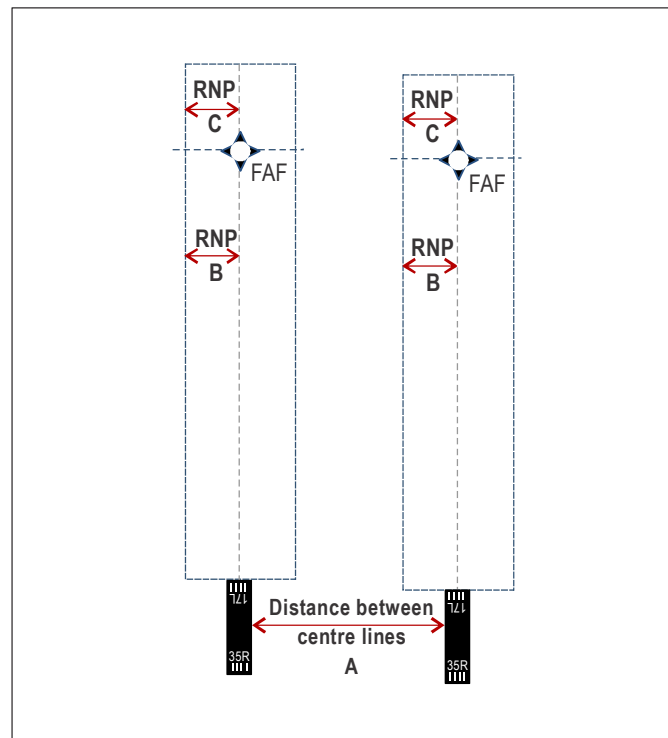


Figure 6-2. RNP value and distance between centre lines

- 3) an APV procedure designed using the RNP AR APCH navigation specification that does not meet the provisions in d) 2) or an RNP APCH, provided that:
 - i) an appropriate, documented safety risk assessment has shown that an acceptable level of safety can be met; and
 - ii) operations are approved by the appropriate ATS authority (Note 1 refers).

Note 1.— The demonstration of the safety of an APV procedure designed using either RNP APCH or RNP AR APCH navigation specification during simultaneous approaches may consider: the collision risk from normal and residual (not mitigated) atypical errors; likelihood of ACAS nuisance alerting during normal operations; wake hazard; monitoring and available levels of system automation; database management; flight management system input and related crew workload; impacts of meteorological conditions and other environmental factors; training; and published ATC break-out procedures.

Note 2.— For examples of approach types and scenarios that meet the requirements of 6.7.3.4.1 d), see Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643) Table 2-3 and Appendix C.

- e) aircraft are advised that approaches are in use to both runways (this information may be provided through the ATIS);

- f) the nominal tracks of the missed approach procedures diverge by at least 30 degrees; and
- g) approach control has a frequency override capability to aerodrome control.

6.7.3.4.2 A minimum of 300 m (1 000 ft) vertical separation or a minimum of 5.6 km (3.0 NM) horizontal separation shall be provided between aircraft until established on the final approach courses or tracks of parallel approaches.

6.7.3.4.3 The minimum horizontal separation to be provided between aircraft established on the same final approach course or track shall be 5.6 km (3.0 NM) or 4.6 km (2.5 NM) as prescribed by the appropriate ATS authority, unless increased longitudinal separation is required due to wake turbulence.

Note.— See Chapter 8, 8.7.3.2 and 8.7.3.4

6.7.3.4.4 The minimum horizontal separation to be provided diagonally between successive aircraft on adjacent final approach courses or tracks shall be:

- a) 3.7 km (2.0 NM) between successive aircraft on adjacent final approach courses or tracks more than 2 529 m (8 300 ft) apart (Figure 6-3); or
- b) 2.8 km (1.5 NM) between successive aircraft on adjacent final approach courses or tracks more than 1 097 m (3 600 ft), but not more than 2 529 m (8 300 ft) apart (Figure 6-4); or
- c) 1.9 km (1.0 NM) between successive aircraft on adjacent final approach courses or tracks more than 915 m (3 000 ft), but not more than 1 097 m (3 600 ft) apart (Figure 6-5).

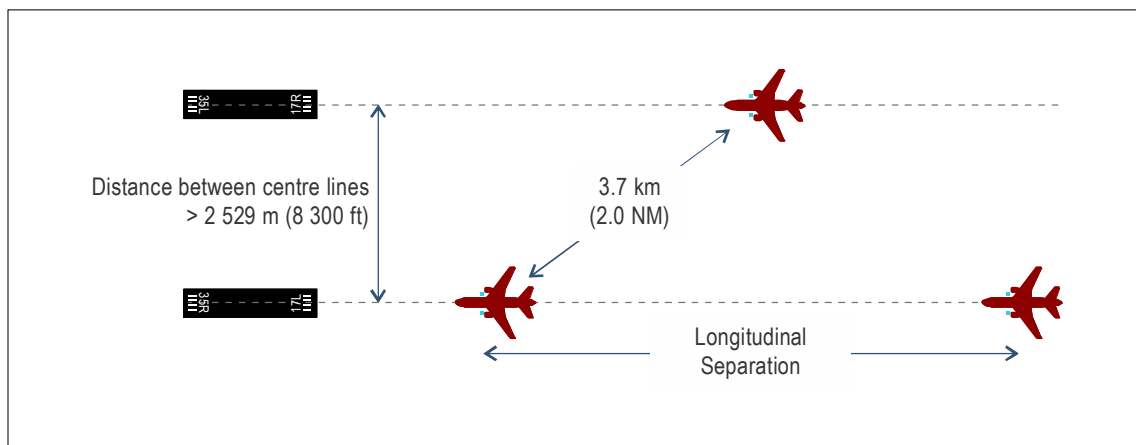


Figure 6-3. Diagonal separation for distance between centre lines greater than 2 529 m (8 300 ft)

7.2.4 Runways should not be selected for noise abatement purposes for landing operations unless they are equipped with suitable glide path guidance, e.g. ILS, or a visual approach slope indicator system for operations in visual meteorological conditions.

7.2.5 A pilot-in-command, prompted by safety concerns, can refuse a runway offered for noise-preferential reasons.

7.2.6 Noise abatement shall not be a determining factor in runway nomination under the following circumstances:

- a) if the runway surface conditions are adversely affected (e.g. by snow, slush, ice, water, mud, rubber, oil or other substances);
- b) for landing in conditions:
 - 1) when the ceiling is lower than 150 m (500 ft) above aerodrome elevation, or the visibility is less than 1 900 m; or
 - 2) when the approach requires use to be made of vertical minima greater than 100 m (300 ft) above aerodrome elevation and:
 - i) the ceiling is lower than 240 m (800 ft) above aerodrome elevation; or
 - ii) the visibility is less than 3 000 m;
- c) for take-off when the visibility is less than 1 900 m;
- d) when wind shear has been reported or forecast or when thunderstorms are expected to affect the approach or departure; and
- e) when the crosswind component, including gusts, exceeds 28 km/h (15 kt), or the tailwind component, including gusts, exceeds 9 km/h (5 kt).

7.3 INITIAL CALL TO AERODROME CONTROL TOWER

For aircraft being provided with aerodrome control service, the initial call shall contain:

- a) designation of the station being called;
- b) call sign and, for aircraft in the SUPER or HEAVY wake turbulence category, the word “super” or “heavy”;
- c) position; and
- d) additional elements, as required by the appropriate ATS authority.

Note.— See also Chapter 4, 4.11.3.1, for aircraft in the air, making the first call to the aerodrome tower.

7.4 INFORMATION TO AIRCRAFT BY AERODROME CONTROL TOWERS

7.4.1 Information related to the operation of aircraft

Note.— See Chapter 11, 11.4.3, regarding flight information messages.

7.4.1.1 START-UP TIME PROCEDURES

7.4.1.1.1 When so requested by the pilot prior to engine start, an expected take-off time should be given, unless engine start-up time procedures are employed.

7.4.1.1.2 Start-up time procedures should be implemented where necessary to avoid congestion and excessive delays on the manoeuvring area or when warranted by ATFM regulations. Start-up time procedures should be contained in local instructions, and should specify the criteria and conditions for determining when and how start-up times shall be calculated and issued to departing flights.

7.4.1.1.3 When an aircraft is subject to ATFM regulations, it should be advised to start up in accordance with its allocated slot time.

7.4.1.1.4 When the delay for a departing aircraft is anticipated to be less than a time period specified by the appropriate ATS authority, an aircraft should be cleared to start up at its own discretion.

7.4.1.1.5 When the delay for a departing aircraft is anticipated to exceed a time period specified by the appropriate ATS authority, the aerodrome control tower should issue an expected start-up time to an aircraft requesting start-up.

7.4.1.1.6 A start-up clearance shall only be withheld under circumstances or conditions specified by the appropriate ATS authority.

7.4.1.1.7 If a start-up clearance is withheld, the flight crew shall be advised of the reason.

7.4.1.2 AERODROME AND METEOROLOGICAL INFORMATION

7.4.1.2.1 Prior to taxiing for take-off, aircraft shall be advised of the following elements of information, in the order listed, with the exception of such elements which it is known the aircraft has already received:

- a) the runway to be used;
- b) the surface wind direction and speed, including significant variations therefrom;
- c) the QNH altimeter setting and, either on a regular basis in accordance with local arrangements or if so requested by the aircraft, the QFE altimeter setting;
- d) the air temperature for the runway to be used, in the case of turbine-engined aircraft;
- e) the visibility representative of the direction of take-off and initial climb, if less than 10 km, or, when applicable, the RVR value(s) for the runway to be used;
- f) the correct time.

Note.— The meteorological information listed above is to follow the criteria used for meteorological local routine and special reports, in accordance with Chapter 11, 11.4.3.2.2 to 11.4.3.2.3.

7.4.1.2.2 Prior to take-off aircraft shall be advised of:

- a) any significant changes in the surface wind direction and speed, the air temperature, and the visibility or RVR value(s) given in accordance with 7.4.1.2.1;
- b) significant meteorological conditions in the take-off and climb-out area, except when it is known that the information has already been received by the aircraft.

Note.— Jet blast and propeller slipstream can produce localized wind velocities of sufficient strength to cause damage to other aircraft, vehicles and personnel operating within the affected area.

7.4.1.7 ABNORMAL AIRCRAFT CONFIGURATION AND CONDITION

7.4.1.7.1 Whenever an abnormal configuration or condition of an aircraft, including conditions such as landing gear not extended or only partly extended, or unusual smoke emissions from any part of the aircraft, is observed by or reported to the aerodrome controller, the aircraft concerned shall be advised without delay.

7.4.1.7.2 When requested by the flight crew of a departing aircraft suspecting damage to the aircraft, the departure runway used shall be inspected without delay and the flight crew advised in the most expeditious manner as to whether any aircraft debris or bird or animal remains have been found or not.

7.5 ESSENTIAL INFORMATION ON AERODROME CONDITIONS

Note.— See Chapter 11, 11.4.3.4, regarding messages containing information on aerodrome conditions.

7.5.1 Essential information on aerodrome conditions is information necessary to safety in the operation of aircraft, which pertains to the movement area or any facilities usually associated therewith. For example, construction work on a taxi strip not connected to the runway-in-use would not be essential information to any aircraft except one that might be taxied in the vicinity of the construction work. As another example, if all traffic must be confined to runways, that fact should be considered as essential aerodrome information to any aircraft not familiar with the aerodrome.

7.5.2 Essential information on aerodrome conditions shall include information relating to the following:

- a) construction or maintenance work on, or immediately adjacent to the movement area;
- b) rough or broken surfaces on a runway, a taxiway or an apron, whether marked or not;
- c) as of 5 November 2020, water, snow, slush, ice or frost on a runway, a taxiway or an apron;
- d) as of 5 November 2020, anti-icing or de-icing liquid chemicals or other contaminant on a runway, taxiway or apron;
- e) snow banks or drifts adjacent to a runway, a taxiway or an apron;
- f) other temporary hazards, including parked aircraft and birds on the ground or in the air;
- g) failure or irregular operation of part or all of the aerodrome lighting system;
- h) any other pertinent information.

Note.— Up-to-date information on the conditions on aprons may not always be available to the aerodrome control tower. The responsibility of the aerodrome control tower in relation to aprons is, with respect to the provisions of 7.5.1 and 7.5.2, limited to the transmission to aircraft of the information which is provided to it by the authority responsible for the aprons.

7.5.3 Essential information on aerodrome conditions shall be given to every aircraft, except when it is known that the aircraft already has received all or part of the information from other sources. The information shall be given in sufficient time for the aircraft to make proper use of it, and the hazards shall be identified as distinctly as possible.

Note.— “Other sources” include NOTAM, ATIS broadcasts, and the display of suitable signals.

7.5.4 When a not previously notified condition pertaining to the safe use by aircraft of the manoeuvring area is reported to or observed by the controller, the appropriate aerodrome authority shall be informed and operations on that part of the manoeuvring area terminated until otherwise advised by the appropriate aerodrome authority.

7.6 CONTROL OF AERODROME TRAFFIC

7.6.1 General

As the view from the flight deck of an aircraft is normally restricted, the controller shall ensure that instructions and information which require the flight crew to employ visual detection, recognition and observation are phrased in a clear, concise and complete manner.

7.6.2 Designated positions of aircraft in the aerodrome traffic and taxi circuits

The following positions of aircraft in the traffic and taxi circuits are the positions where aircraft normally receive aerodrome control tower clearances. Aircraft should be watched closely as they approach these positions so that proper clearances may be issued without delay. Where practicable, all clearances should be issued without waiting for aircraft to initiate the call.

Position 1. Aircraft initiates call to taxi for departing flight. Runway-in-use information and taxi clearances given.

Position 2. If there is conflicting traffic, the departing aircraft will be held at this position. Engine run-up will, when required, normally be performed here.

Position 3. Take-off clearance is issued here, if not practicable at position 2.

Position 4. Clearance to land is issued here as practicable.

Position 5. Clearance to taxi to apron is issued here.

Position 6. Parking information issued here, if necessary.

Note 1.— Arriving aircraft executing an instrument approach procedure will normally enter the traffic circuit on final except when visual manoeuvring to the landing runway is required.

Note 2.— See Figure 7-1.

7.6.3 Traffic on the manoeuvring area

7.6.3.1 CONTROL OF TAXIING AIRCRAFT

7.6.3.1.1 TAXI CLEARANCE

7.6.3.1.1.1 Prior to issuing a taxi clearance, the controller shall determine where the aircraft concerned is parked. Taxi clearances shall contain concise instructions and adequate information so as to assist the flight crew to follow the correct taxi routes, to avoid collision with other aircraft or objects and to minimize the potential for the aircraft inadvertently entering an active runway.

7.6.3.1.1.2 When a taxi clearance contains a taxi limit beyond a runway, it shall contain an explicit clearance to cross or an instruction to hold short of that runway.

- d) other aircraft as may be determined by the appropriate authority.

Note.— An aircraft which has encountered an emergency is handled as outlined in Chapter 15, Section 15.1.

7.8 ORDER OF PRIORITY FOR ARRIVING AND DEPARTING AIRCRAFT

An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway.

7.9 CONTROL OF DEPARTING AIRCRAFT

7.9.1 Departure sequence

Departures shall normally be cleared in the order in which they are ready for take-off, except that deviations may be made from this order of priority to facilitate the maximum number of departures with the least average delay. Factors which should be considered in relation to the departure sequence include, *inter alia*:

- a) types of aircraft and their relative performance;
- b) routes to be followed after take-off;
- c) any specified minimum departure interval between take-offs;
- d) need to apply wake turbulence separation minima;
- e) aircraft which should be afforded priority; and
- f) aircraft subject to ATFM requirements.

Note 1.— See also Chapter 6, 6.3.3.

Note 2.— For aircraft subject to ATFM requirements, it is the responsibility of the pilot and the operator to ensure that the aircraft is ready to taxi in time to meet any required departure time, bearing in mind that once a departure sequence is established on the taxiway system, it can be difficult, and sometimes impossible, to change the order.

7.9.2 Separation of departing aircraft

Except as provided in 7.11 and Chapter 5, Section 5.8, a departing aircraft will not normally be permitted to commence take-off until the preceding departing aircraft has crossed the end of the runway-in-use or has started a turn or until all preceding landing aircraft are clear of the runway-in-use.

Note 1.— See Figure 7-2.

Note 2.— Wake turbulence categories and groups are contained in Chapter 4, Section 4.9 and time-based wake turbulence longitudinal separation minima are contained in Chapter 5, Section 5.8. Distance-based wake turbulence separation minima are contained in Chapter 8, Section 8.7.

Note 3.— See 7.6.3.1.2.2.

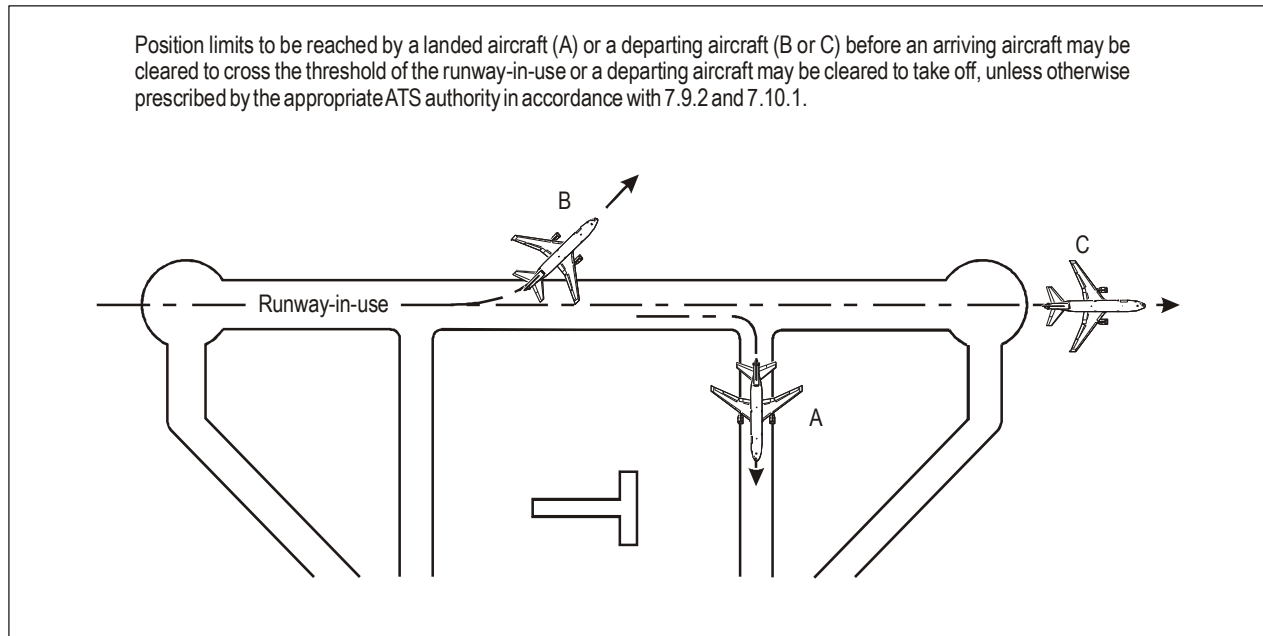


Figure 7-2. Separation between departing and arriving aircraft (see 7.9.2 and 7.10.1)

7.9.3 Take-off clearance

7.9.3.1 Take-off clearance may be issued to an aircraft when there is reasonable assurance that the separation in 7.9.2, or prescribed in accordance with 7.11, will exist when the aircraft commences take-off.

7.9.3.2 When an ATC clearance is required prior to take-off, the take-off clearance shall not be issued until the ATC clearance has been transmitted to and acknowledged by the aircraft concerned. The ATC clearance shall be forwarded to the aerodrome control tower with the least possible delay after receipt of a request made by the tower or prior to such request if practicable.

7.9.3.3 The expression TAKE-OFF shall only be used in radiotelephony when an aircraft is cleared for take-off or when cancelling a take-off clearance.

Note.— The expression TORA, pronounced TOR-AH, may be used to indicate take-off run available.

7.9.3.4 Subject to 7.9.3.2, the take-off clearance shall be issued when the aircraft is ready for take-off and at or approaching the departure runway, and the traffic situation permits. To reduce the potential for misunderstanding, the take-off clearance shall include the designator of the departure runway.

7.9.3.5 In the interest of expediting traffic, a clearance for immediate take-off may be issued to an aircraft before it enters the runway. On acceptance of such clearance the aircraft shall taxi out to the runway and take off in one continuous movement.

7.10 CONTROL OF ARRIVING AIRCRAFT

7.10.1 Separation of landing aircraft and preceding landing and departing aircraft using the same runway

Except as provided in 7.11 and Chapter 5, Section 5.8, a landing aircraft will not normally be permitted to cross the runway threshold on its final approach until the preceding departing aircraft has crossed the end of the runway-in-use, or has started a turn, or until all preceding landing aircraft are clear of the runway-in-use.

Note 1.— See Figure 7-2.

Note 2.— Wake turbulence categories and groups are contained in Chapter 4, Section 4.9 and time-based wake turbulence longitudinal separation minima are contained in Chapter 5, Section 5.8.

Note 3.— See 7.6.3.1.2.2.

7.10.2 Clearance to land

An aircraft may be cleared to land when there is reasonable assurance that the separation in 7.10.1, or prescribed in accordance with 7.11 will exist when the aircraft crosses the runway threshold, provided that a clearance to land shall not be issued until a preceding landing aircraft has crossed the runway threshold. To reduce the potential for misunderstanding, the landing clearance shall include the designator of the landing runway.

7.10.3 Landing and roll-out manoeuvres

7.10.3.1 When necessary or desirable in order to expedite traffic, a landing aircraft may be requested to:

- a) hold short of an intersecting runway after landing;
- b) land beyond the touchdown zone of the runway;
- c) vacate the runway at a specified exit taxiway;
- d) expedite vacating the runway.

7.10.3.2 In requesting a landing aircraft to perform a specific landing and/or roll-out manoeuvre, the type of aircraft, runway length, location of exit taxiways, reported braking action on runway and taxiway, and prevailing meteorological conditions shall be considered. A SUPER or HEAVY aircraft shall not be requested to land beyond the touchdown zone of a runway.

7.10.3.3 If the pilot-in-command considers that he or she is unable to comply with the requested operation, the controller shall be advised without delay.

7.10.3.4 When necessary or desirable, e.g. due to low visibility conditions, a landing or a taxiing aircraft may be instructed to report when a runway has been vacated. The report shall be made when the entire aircraft is beyond the relevant runway-holding position.

7.11 REDUCED RUNWAY SEPARATION MINIMA BETWEEN AIRCRAFT USING THE SAME RUNWAY

7.11.1 Provided that an appropriate, documented safety risk assessment has shown that an acceptable level of safety can be met, lower minima than those in 7.9.2 and 7.10.1 may be prescribed by the appropriate ATS authority, after consultation with the operators. The safety risk assessment shall be carried out for each runway for which the reduced minima are intended, taking into account factors such as:

- a) runway length;
- b) aerodrome layout; and
- c) types/categories of aircraft involved.

7.11.2 All applicable procedures related to the application of reduced runway separation minima shall be published in the Aeronautical Information Publication as well as in local air traffic control instructions. Controllers shall be provided with appropriate and adequate training in the use of the procedures.

7.11.3 Reduced runway separation minima shall only be applied during the hours of daylight from 30 minutes after local sunrise to 30 minutes before local sunset.

7.11.4 For the purpose of reduced runway separation, aircraft shall be classified as follows:

- a) *Category 1 aircraft*: single-engine propeller aircraft with a maximum certificated take-off mass of 2 000 kg or less;
- b) *Category 2 aircraft*: single-engine propeller aircraft with a maximum certificated take-off mass of more than 2 000 kg but less than 7 000 kg; and twin-engine propeller aircraft with a maximum certificated take-off mass of less than 7 000 kg;
- c) *Category 3 aircraft*: all other aircraft.

7.11.5 Reduced runway separation minima shall not apply between a departing aircraft and a preceding landing aircraft.

7.11.6 Reduced runway separation minima shall be subject to the following conditions:

- a) wake turbulence separation minima shall be applied;
- b) visibility shall be at least 5 km and ceiling shall not be lower than 300 m (1 000 ft);
- c) tailwind component shall not exceed 5 kt;
- d) there shall be available means, such as suitable landmarks, to assist the controller in assessing the distances between aircraft. A surface surveillance system that provides the air traffic controller with position information on aircraft may be utilized, provided that approval for operational use of such equipment includes a safety risk assessment to ensure that all requisite operational and performance requirements are met;
- e) minimum separation continues to exist between two departing aircraft immediately after take-off of the second aircraft;

8.6.10 Reporting of significant meteorological information to meteorological offices

Although a controller is not required to keep a special watch for heavy precipitation, etc., information on the position, intensity, extent and movement of significant meteorological conditions (i.e. heavy showers or well-defined frontal surfaces) as observed on situation displays should, when practicable, be reported to the associated meteorological office.

8.7 USE OF ATS SURVEILLANCE SYSTEMS IN THE AIR TRAFFIC CONTROL SERVICE

Note.— The procedures in this Section are general procedures applicable when an ATS surveillance system is used in the provision of area control service or approach control service. Additional procedures applicable in the provision of approach control service are detailed in Section 8.9.

8.7.1 Functions

The information provided by ATS surveillance systems and presented on a situation display may be used to perform the following functions in the provision of air traffic control service:

- a) provide ATS surveillance services as necessary in order to improve airspace utilization, reduce delays, provide for direct routings and more optimum flight profiles, as well as to enhance safety;
- b) provide vectoring to departing aircraft for the purpose of facilitating an expeditious and efficient departure flow and expediting climb to cruising level;
- c) provide vectoring to aircraft for the purpose of resolving potential conflicts;
- d) provide vectoring to arriving aircraft for the purpose of establishing an expeditious and efficient approach sequence;
- e) provide vectoring to assist pilots in their navigation, e.g. to or from a radio navigation aid, away from or around areas of adverse weather;
- f) provide separation and maintain normal traffic flow when an aircraft experiences communication failure within the area of coverage;
- g) maintain flight path monitoring of air traffic;

Note.— Where tolerances regarding such matters as adherence to track, speed or time have been prescribed by the appropriate ATS authority, deviations are not considered significant until such tolerances are exceeded.

- h) when applicable, maintain a watch on the progress of air traffic, in order to provide a procedural controller with:
 - i) improved position information regarding aircraft under control;
 - ii) supplementary information regarding other traffic; and
 - iii) information regarding any significant deviations by aircraft from the terms of their respective air traffic control clearances, including their cleared routes as well as levels, when appropriate.

8.7.2 Separation application

Note.— Factors which the controller using an ATS surveillance system must take into account in determining the spacing to be applied in particular circumstances in order to ensure that the separation minimum is not infringed include aircraft relative headings and speeds, ATS surveillance system technical limitations, controller workload and any difficulties caused by communication congestion. Guidance material on this subject is contained in the Air Traffic Services Planning Manual (Doc 9426).

8.7.2.1 Except as provided for in 8.7.2.8, 8.7.2.9 and 8.8.2.2, the separation minima specified in 8.7.3 and 8.7.4 shall only be applied between identified aircraft when there is reasonable assurance that identification will be maintained.

8.7.2.2 When control of an identified aircraft is to be transferred to a control sector that will provide the aircraft with procedural separation, such separation shall be established by the transferring controller before the aircraft reaches the limits of the transferring controller's area of responsibility, or before the aircraft leaves the relevant area of surveillance coverage.

8.7.2.3 When authorized by the appropriate ATS authority, separation based on the use of ADS-B, SSR and/or MLAT, and/or PSR position symbols and/or PSR blips shall be applied so that the distance between the centres of the position symbols and/or PSR blips, representing the positions of the aircraft concerned, is never less than a prescribed minimum.

8.7.2.4 Separation based on the use of PSR blips and SSR responses shall be applied so that the distance between the centre of the PSR blip and the nearest edge of the SSR response (or centre, when authorized by the appropriate ATS authority) is never less than a prescribed minimum.

8.7.2.5 Separation based on the use of ADS-B position symbols and SSR responses shall be applied so that the distance between the centre of the ADS-B position symbol and the nearest edge of the SSR response (or the centre, when authorized by the appropriate ATS authority) is never less than a prescribed minimum.

8.7.2.6 Separation based on the use of SSR responses shall be applied so that the distance between the closest edges of the SSR responses (of the centres, when authorized by the appropriate ATS authority) is never less than a prescribed minimum.

8.7.2.7 In no circumstances shall the edges of the position indications touch or overlap unless vertical separation is applied between the aircraft concerned, irrespective of the type of position indication displayed and separation minimum applied.

8.7.2.8 In the event that the controller has been notified of a controlled flight entering or about to enter the airspace within which the separation minima specified in 8.7.3 is applied, but has not identified the aircraft, the controller may, if so prescribed by the appropriate ATS authority, continue to provide an ATS surveillance service to identified aircraft provided that:

- a) reasonable assurance exists that the unidentified controlled flight will be identified using SSR and/or ADS-B and/or MLAT or the flight is being operated by an aircraft of a type which may be expected to give an adequate return on primary radar in the airspace within which the separation is applied; and
- b) the separation is maintained between identified flights and any other observed ATS surveillance system position indications until either the unidentified controlled flight has been identified or procedural separation has been established.

8.7.2.9 The separation minima specified in 8.7.3 may be applied between an aircraft taking off and a preceding departing aircraft or other identified traffic provided there is reasonable assurance that the departing aircraft will be identified within 2 km (1 NM) from the end of the runway, and that, at the time, the required separation will exist.

8.7.2.10 The separation minima specified in 8.7.3 shall not be applied between aircraft holding over the same holding fix. Application of ATS surveillance system separation minima based on radar and/or ADS-B and/or MLAT systems between holding aircraft and other flights shall be subject to requirements and procedures prescribed by the appropriate ATS authority.

8.7.3 Separation minima based on ATS surveillance systems

8.7.3.1 Unless otherwise prescribed in accordance with 8.7.3.2, 8.7.3.3 or 8.7.3.4, or Chapter 6 (with respect to independent and dependent parallel approaches), the horizontal separation minimum based on radar and/or ADS-B and/or MLAT systems shall be 9.3 km (5.0 NM).

8.7.3.2 The separation minimum in 8.7.3.1 may, if so prescribed by the appropriate ATS authority, be reduced, but not below:

- a) 5.6 km (3.0 NM) when radar and/or ADS-B and/or MLAT systems' capabilities at a given location so permit; and
- b) 4.6 km (2.5 NM) between succeeding aircraft which are established on the same final approach track within 18.5 km (10 NM) of the runway threshold. A reduced separation minimum of 4.6 km (2.5 NM) may be applied, provided:
 - i) the average runway occupancy time of landing aircraft is proven, by means such as data collection and statistical analysis and methods based on a theoretical model, not to exceed 50 seconds;
 - ii) braking action is reported as good and runway occupancy times are not adversely affected by runway contaminants such as slush, snow or ice;
 - iii) an ATS surveillance system with appropriate azimuth and range resolution and an update rate of 5 seconds or less is used in combination with suitable displays;
 - iv) the aerodrome controller is able to observe, visually or by means of surface movement radar (SMR), MLAT system or a surface movement guidance and control system (SMGCS), the runway-in-use and associated exit and entry taxiways;
 - v) distance-based wake turbulence separation minima in 8.7.3.4, or as may be prescribed by the appropriate ATS authority (e.g. for specific aircraft types), do not apply;
 - vi) aircraft approach speeds are closely monitored by the controller and when necessary adjusted so as to ensure that separation is not reduced below the minimum;
 - vii) aircraft operators and pilots have been made fully aware of the need to exit the runway in an expeditious manner whenever the reduced separation minimum on final approach is applied; and
 - viii) procedures concerning the application of the reduced minimum are published in AIPs.

8.7.3.3 The separation minimum or minima based on radar and/or ADS-B and/or MLAT systems to be applied shall be prescribed by the appropriate ATS authority according to the capability of the particular ATS surveillance system or sensor to accurately identify the aircraft position in relation to the centre of a position symbol, PSR blip, SSR response and taking into account factors which may affect the accuracy of the ATS surveillance system-derived information, such as aircraft range from the radar site and the range scale of the situation display in use.

8.7.3.4 When using wake turbulence categories contained in Chapter 4, 4.9.1.1, the following distance-based wake turbulence separation minima shall be applied to aircraft being provided with an ATS surveillance service in the approach and departure phases of flight in the circumstances given in 8.7.3.6.

<i>Aircraft category</i>		<i>Distance-based wake turbulence separation minima</i>
<i>Preceding aircraft</i>	<i>Succeeding aircraft</i>	
SUPER	HEAVY	9.3 km (5.0 NM)
	MEDIUM	13.0 km (7.0 NM)
	LIGHT	14.9 km (8.0 NM)
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)

8.7.3.5 When applying the wake turbulence groups in Chapter 4, 4.9.1.2, the following distance-based wake turbulence separation minima shall be applied to aircraft being provided with an ATS surveillance service in the approach and departure phases of flight, in the circumstances given in 8.7.3.6:

<i>Preceding aircraft group</i>	<i>Succeeding aircraft group</i>	<i>Distance-based wake turbulence separation minima</i>
A	B C D E F G	7.4 km (4.0 NM) 9.3 km (5.0 NM) 9.3 km (5.0 NM) 11.1 km (6.0 NM) 11.1 km (6.0 NM) 14.9 km (8.0 NM)
B	B C D E F G	5.6 km (3.0 NM) 7.4 km (4.0 NM) 7.4 km (4.0 NM) 9.3 km (5.0 NM) 9.3 km (5.0 NM) 13.0 km (7.0 NM)
C	D E F G	5.6 km (3.0 NM) 6.5 km (3.5 NM) 6.5 km (3.5 NM) 11.1 km (6.0 NM)
D	G	7.4 km (4 NM)
E	G	7.4 km (4 NM)

8.7.3.6 The minima set out in 8.7.3.4 and 8.7.3.5 shall be applied when:

a) an aircraft is operating directly behind another aircraft at the same altitude or less than 300 m (1 000 ft) below (see Figure 8-1); or

- b) both aircraft are using the same runway, or parallel runways separated by less than 760 m (2 500 ft); or
- c) an aircraft is crossing behind another aircraft, at the same altitude or less than 300 m (1 000 ft) below (see Figure 8-1).

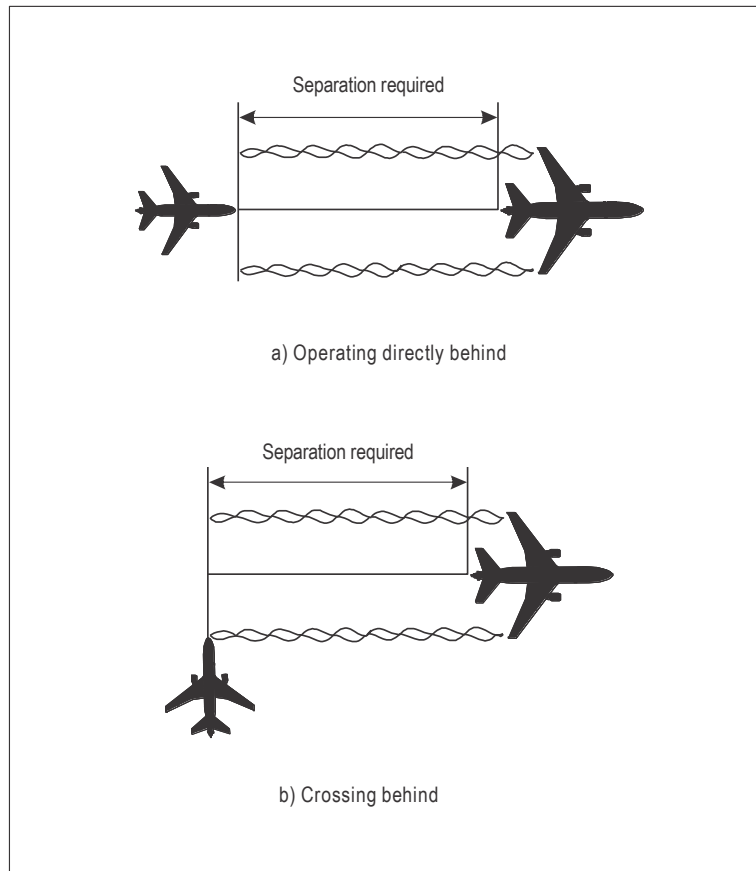


Figure 8-1. Operating directly behind or crossing behind
(see 8.7.3.4 and 8.7.3.5)

8.7.4 Separation minima using ATS surveillance systems where VHF voice communications are not available

Note 1.— Guidance material for the implementation of the navigation capability supporting the separation minima in 8.7.4.2, 8.7.4.3 and 8.7.4.4 is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

Note 2.— Guidance material for the implementation of communication and surveillance capability supporting the separation minima in 8.7.4.2, 8.7.4.3 and 8.7.4.4 is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869) and the Global Operational Data Link (GOLD) Manual (Doc 10037).

Note 3.— Detailed information on the analysis used to determine these separation minima, as well as their implementation considerations, tolerable values for occupancy and deviation rates and associated monitoring procedures, are contained in the Guidelines for the Implementation of Separation Minima Using ATS Surveillance Systems Where Very High Frequency (VHF) Voice Communications Are Not Available (Doc 10116).

Note 4.— Application of the separation minima in 8.7.4.2, 8.7.4.3 and 8.7.4.4 includes elements of both procedural control and ATS surveillance services; refer to Annex 1 — Personnel Licensing for applicable air traffic controller rating requirements.

8.7.4.1 Where direct controller-pilot VHF voice communications are not available, separation minima described in 8.7.4.2, 8.7.4.3 and 8.7.4.4 may be applied utilizing positioning information derived from an ATS surveillance system, provided the following requirements are met:

- a) a navigational performance of RNP 4 or RNP 2 shall be prescribed;
- b) the communication system shall satisfy RCP 240;
- c) an alternate means of communication shall be available so as to allow the controller to intervene and resolve a conflict within a total time of nine minutes, should the normal means of communication fail; and

Note.— The total time specified in c) includes the four minutes allocated to RCP 240.

- d) route conformance monitoring shall be ensured by the use of ATS surveillance system lateral deviation alerts with a warning threshold normally set at a maximum 3.0 NM.
 - 1) Warning thresholds greater than 5.6 km (3.0 NM) may be set, provided the lateral separation minima in 8.7.4.2 a) and 8.7.4.3 are increased by 1.9 km (1.0 NM) for each 1.9 km (1.0 NM) that the warning threshold is increased; and
 - 2) ATS surveillance systems shall provide for the display of alerts in a clear and distinct manner to enable immediate action by the controller in the event of a lateral deviation.

8.7.4.2 Unless otherwise prescribed in accordance with 8.7.4.3 and 8.7.4.4, the separation minima shall be:

- a) 35.2 km (19.0 NM) lateral spacing between parallel or non-intersecting tracks;
- b) 35.2 km (19.0 NM) lateral separation of aircraft operating on intersecting tracks applied in accordance with 5.4.2.1.5 a) and b);
- c) 31.5 km (17.0 NM) longitudinal separation of aircraft operating on same tracks or crossing tracks applied in accordance with 5.4.2.9.5 provided that the relative angle between the tracks is less than 90 degrees; and
- d) opposite direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft, provided that surveillance position reports have been received from both aircraft demonstrating the aircraft have passed each other by 9.3 km (5.0 NM).

8.7.4.3 The separation minimum in 8.7.4.2 a) may, if so prescribed by the appropriate ATS authority, be reduced, but not below 27.8 km (15.0 NM), provided either:

- a) the density of traffic in the airspace, as measured by occupancy, is less than 0.6; or
- b) the proportion of total flight time spent by aircraft off the cleared track does not exceed the following:
 - 1) for aircraft deviating 13.0 km (7.0 NM) or more off the cleared track, 3×10^{-5} per flight hour; and
 - 2) for aircraft deviating 20.4 km (11.0 NM) or more off the cleared track, 1×10^{-5} per flight hour.

8.7.4.4 The separation minimum in 8.7.4.2 c) may be reduced to 26 km (14 NM), provided that the relative angle between the tracks is less than 45 degrees.

8.7.4.5 Vectoring shall not be used in the application of these separation minima.

8.7.5 Transfer of control

8.7.5.1 Where an ATS surveillance service is being provided, transfer of control should be effected, whenever practicable, so as to enable the uninterrupted provision of the ATS surveillance service.

8.7.5.2 Where SSR and/or ADS-B and/or MLAT is used and the display of position indications with associated labels is provided for, transfer of control of aircraft between adjacent control positions or between adjacent ATC units may be effected without prior coordination, provided that:

- a) updated flight plan information on the aircraft about to be transferred, including the discrete assigned SSR code or, with respect to Mode S and ADS-B, the aircraft identification, is provided to the accepting controller prior to transfer;
- b) the ATS surveillance system coverage provided to the accepting controller is such that the aircraft concerned is presented on the situation display before the transfer is effected and is identified on, but preferably before, receipt of the initial call;
- c) when the controllers are not physically adjacent, two-way direct speech facilities, which permit communications to be established instantaneously, are available between them at all times;

Note.— “Instantaneous” refers to communications which effectively provide for immediate access between controllers.

- d) the transfer point or points and all other conditions of application, such as direction of flight, specified levels, transfer of communication points, and especially an agreed minimum separation between aircraft, including that applicable to succeeding aircraft on the same route, about to be transferred as observed on the situation display, have been made the subject of specific instructions (for intra-unit transfer) or of a specific letter of agreement between two adjacent ATC units;
- e) the instructions or letter of agreement specify explicitly that the application of this type of transfer of control may be terminated at any time by the accepting controller, normally with an agreed advance notice;
- f) the accepting controller is informed of any level, speed or vectoring instructions given to the aircraft prior to its transfer and which modify its anticipated flight progress at the point of transfer.

8.7.5.3 The minimum agreed separation between aircraft about to be transferred (8.7.5.2 d) refers) and the advance notice (8.7.5.2 e) refers) shall be determined taking into account all relevant technical, operational and other circumstances. If circumstances arise in which these agreed conditions can no longer be satisfied, controllers shall revert to the procedure in 8.7.5.4 until the situation is resolved.

8.7.5.4 Where primary radar is being used, and where another type of ATS surveillance system is employed but the provisions of 8.7.5.2 are not applied, the transfer of control of aircraft between adjacent control positions or between two adjacent ATC units may be effected, provided that:

- a) identification has been transferred to or has been established directly by the accepting controller;

- b) when the controllers are not physically adjacent, two-way direct-speech facilities between them are at all times available which permit communications to be established instantaneously;
- c) separation from other controlled flights conforms to the minima authorized for use during transfer of control between the sectors or units concerned;
- d) the accepting controller is informed of any level, speed or vectoring instructions applicable to the aircraft at the point of transfer;
- e) radiocommunication with the aircraft is retained by the transferring controller until the accepting controller has agreed to assume responsibility for providing the ATS surveillance service to the aircraft. Thereafter, the aircraft should be instructed to change over to the appropriate channel and from that point is the responsibility of the accepting controller.

8.7.6 Speed control

Subject to conditions specified by the appropriate ATS authority, including consideration of aircraft performance limitations, a controller may, in order to facilitate sequencing or to reduce the need for vectoring, request aircraft to adjust their speed in a specified manner.

Note.— *Procedures for speed control instructions are contained in Chapter 4, Section 4.6.*

8.8 EMERGENCIES, HAZARDS AND EQUIPMENT FAILURES

Note.— *See also Chapter 15.*

8.8.1 Emergencies

8.8.1.1 In the event of an aircraft in, or appearing to be in, any form of emergency, every assistance shall be provided by the controller, and the procedures prescribed herein may be varied according to the situation.

8.8.1.2 The progress of an aircraft in emergency shall be monitored and (whenever possible) plotted on the situation display until the aircraft passes out of coverage of the ATS surveillance system, and position information shall be provided to all air traffic services units which may be able to give assistance to the aircraft. Transfer to adjacent sectors shall also be effected when appropriate.

Note.— *If the pilot of an aircraft encountering a state of emergency has previously been directed by ATC to select a specific transponder code and/or an ADS-B emergency mode, that code/mode will normally be maintained unless, in special circumstances, the pilot has decided or has been advised otherwise. Where ATC has not requested a code or emergency mode to be set, the pilot will set the transponder to Mode A Code 7700 and/or the appropriate ADS-B emergency mode.*

8.8.1.3 Whenever a general ADS-B emergency alert is observed on the situation display and there is no other indication of the particular nature of the emergency, the controller shall take the following action:

- a) attempt to establish communication with the aircraft to verify the nature of the emergency; or
- b) if no response is received from the aircraft, the controller shall attempt to ascertain if the aircraft is able to receive transmissions from the air traffic control unit by requesting it to execute a specified manoeuvre which can be observed on the situation display.

Note 1.— Some aircraft equipped with first generation ADS-B avionics have the capability to transmit a general emergency alert only, regardless of the code selected by the pilot.

Note 2.— Some aircraft equipped with first generation ADS-B avionics do not have the capability of squawking IDENT while the emergency and/or urgency mode is selected.

8.8.2 Collision hazard information

8.8.2.1 When an identified controlled flight is observed to be on a conflicting path with an unknown aircraft deemed to constitute a collision hazard, the pilot of the controlled flight shall, whenever practicable:

- a) be informed of the unknown aircraft, and if so requested by the controlled flight or if, in the opinion of the controller, the situation warrants, a course of avoiding action should be suggested; and
- b) be notified when the conflict no longer exists.

8.8.2.2 When an identified IFR flight operating outside controlled airspace is observed to be on a conflicting path with another aircraft, the pilot should:

- a) be informed as to the need for collision avoidance action to be initiated, and if so requested by the pilot or if, in the opinion of the controller, the situation warrants, a course of avoiding action should be suggested; and
- b) be notified when the conflict no longer exists.

8.8.2.3 Information regarding traffic on a conflicting path should be given, whenever practicable, in the following form:

- a) relative bearing of the conflicting traffic in terms of the 12-hour clock;
- b) distance from the conflicting traffic in kilometres (nautical miles);
- c) direction in which the conflicting traffic appears to be proceeding;
- d) level and type of aircraft or, if unknown, relative speed of the conflicting traffic, e.g. slow or fast.

8.8.2.4 Pressure-altitude-derived level information, even when unverified, should be used in the provision of collision hazard information because such information, particularly if available from an otherwise unknown aircraft (e.g. a VFR flight) and given to the pilot of a known aircraft, could facilitate the location of a collision hazard.

8.8.2.4.1 When the pressure-altitude-derived level information has been verified, the information shall be passed to pilots in a clear and unambiguous manner. If the level information has not been verified, the accuracy of the information should be considered uncertain and the pilot shall be informed accordingly.

8.8.3 Failure of equipment

8.8.3.1 AIRCRAFT RADIO TRANSMITTER FAILURE

8.8.3.1.1 If two-way communication is lost with an aircraft, the controller should determine whether or not the aircraft's receiver is functioning by instructing the aircraft on the channel so far used to acknowledge by making a specified manoeuvre and by observing the aircraft's track, or by instructing the aircraft to operate IDENT or to make SSR code and/or ADS-B transmission changes.

Note 1.— Transponder-equipped aircraft experiencing radiocommunication failure will operate the transponder on Mode A Code 7600.

Note 2.— ADS-B-equipped aircraft experiencing radiocommunication failure may transmit the appropriate ADS-B emergency and/or urgency mode.

8.8.3.1.2 If the action prescribed in 8.8.3.1.1 is unsuccessful, it shall be repeated on any other available channel on which it is believed that the aircraft might be listening.

8.8.3.1.3 In both the cases covered by 8.8.3.1.1 and 8.8.3.1.2, any manoeuvring instructions shall be such that the aircraft would regain its current cleared track after having complied with the instructions received.

8.8.3.1.4 Where it has been established by the action in 8.8.3.1.1 that the aircraft's radio receiver is functioning, continued control can be effected using SSR code/ADS-B transmission changes or IDENT transmissions to obtain acknowledgement of clearances issued to the aircraft.

Chapter 10

COORDINATION

10.1 COORDINATION IN RESPECT OF THE PROVISION OF AIR TRAFFIC CONTROL SERVICE

10.1.1 General

10.1.1.1 The coordination and transfer of control of a flight between successive ATC units and control sectors shall be effected by a dialogue comprising the following stages:

- a) notification of the flight in order to prepare for coordination, as necessary;
- b) coordination of conditions of transfer of control by the transferring ATC unit;
- c) coordination, if necessary, and acceptance of conditions of transfer of control by the accepting ATC unit; and
- d) the transfer of control to the accepting ATC unit or control sector.

10.1.1.2 ATC units should, to the extent possible, establish and apply standardized procedures for the coordination and transfer of control of flights, in order, *inter alia*, to reduce the need for verbal coordination. Such coordination procedures shall conform to the procedures contained in the following provisions and be specified in letters of agreement and local instructions, as applicable.

10.1.1.3 Such agreements and instructions shall cover the following as applicable:

- a) definition of areas of responsibility and common interest, airspace structure and airspace classification(s);
- b) any delegation of responsibility for the provision of ATS;
- c) procedures for the exchange of flight plan and control data, including use of automated and/or verbal coordination messages;
- d) means of communication;
- e) requirements and procedures for approval requests;
- f) significant points, levels or times for transfer of control;
- g) significant points, levels or times for transfer of communication;
- h) conditions applicable to the transfer and acceptance of control, such as specified altitudes/flight levels, specific separation minima or spacing to be established at the time of transfer, and the use of automation;
- i) ATS surveillance system coordination procedures;
- j) SSR code assignment procedures;

- k) procedures for departing traffic;
- l) designated holding fixes and procedures for arriving traffic;
- m) applicable contingency procedures; and
- n) any other provisions or information relevant to the coordination and transfer of control of flights.

10.1.2 Coordination between ATC units providing air traffic service within contiguous control areas

10.1.2.1 GENERAL

10.1.2.1.1 ATC units shall forward from unit to unit, as the flight progresses, necessary flight plan and control information. When so required by agreement between the appropriate ATS authorities to assist in the separation of aircraft, flight plan and flight progress information for flights along specified routes or portions of routes in close proximity to flight information region boundaries shall also be provided to the ATC units in charge of the flight information regions adjacent to such routes or portions of routes.

Note 1.— Such a route or portion of route is often referred to as an area of common interest, the extent of which is usually determined by the required separation minima.

Note 2.— See also 10.2.4.

10.1.2.1.2 The flight plan and control information shall be transmitted in sufficient time to permit reception and analysis of the data by the receiving unit(s) and necessary coordination between the units concerned.

Note.— See Chapter 11 and Appendices 3 and 6 for details regarding messages, their content and time of transmission.

10.1.2.2 TRANSFER OF CONTROL

10.1.2.2.1 The responsibility for the control of an aircraft shall be transferred from the ATC unit to the next unit at the time of crossing the common control area boundary as determined by the unit having control of the aircraft or at such other point or time as has been agreed between the two units.

10.1.2.2.2 Where specified in letters of agreement between the ATC units concerned, and when transferring an aircraft, the transferring unit shall notify the accepting unit that the aircraft is in position to be transferred, and specify that the responsibility for control should be assumed by the accepting unit forthwith at the time of crossing the control boundary or other transfer control point specified in letters of agreement between the ATC units or at such other point or time coordinated between the two units.

10.1.2.2.3 If the transfer of control time or point is other than forthwith, the accepting ATC unit shall not alter the clearance of the aircraft prior to the agreed transfer of control time or point without the approval of the transferring unit.

10.1.2.2.4 If transfer of communication is used to transfer an aircraft to a receiving ATC unit, responsibility for control shall not be assumed until the time of crossing the control area boundary or other transfer of control point specified in letters of agreement between the ATC units.

10.1.2.2.5 When transfer of control of identified aircraft is to be effected, the appropriate procedures specified in Chapter 8, Section 8.7.5, shall be applied.

11.4.3.3 MESSAGES CONCERNING THE OPERATION OF AERONAUTICAL FACILITIES

Note.— *General provisions concerning this subject are set forth in Annex 11, 4.2.*

Messages concerning the operation of aeronautical facilities shall be transmitted to aircraft from whose flight plan it is apparent that the operation of the flight may be affected by the operating status of the operating facility concerned. They shall contain appropriate data on the service status of the facility in question, and, if the facility is out of operation, an indication when the normal operating status will be restored.

11.4.3.4 MESSAGES CONTAINING INFORMATION ON AERODROME CONDITIONS

Note.— *Provisions regarding the issuance of information on aerodrome conditions are contained in Chapter 7, 7.5.*

11.4.3.4.1 Whenever information is provided on aerodrome conditions, this shall be done in a clear and concise manner so as to facilitate appreciation by the pilot of the situation described. It shall be issued whenever deemed necessary by the controller on duty in the interest of safety, or when requested by an aircraft. If the information is provided on the initiative of the controller, it shall be transmitted to each aircraft concerned in sufficient time to enable the pilot to make proper use of the information.

11.4.3.4.2 As of 5 November 2020, whenever information is provided concerning runway surface conditions that may adversely affect aircraft braking action, the following terms shall be used, as necessary:

COMPACTED SNOW

DRY

DRY SNOW

DRY SNOW ON TOP OF COMPACTED SNOW

DRY SNOW ON TOP OF ICE

FROST

ICE

SLUSH

STANDING WATER

WATER ON TOP OF COMPACTED SNOW

WET

WET ICE

WET SNOW

WET SNOW ON TOP OF COMPACTED SNOW

WET SNOW ON TOP OF ICE

11.4.3.4.3 As of 5 November 2020, appropriate ATS units shall have available for transmission to aircraft, upon request, the runway condition report (RCR) information. This shall be passed to aircraft in the order of the direction of landing or take-off.

11.4.3.5 MESSAGES CONCERNING AIR TRAFFIC INCIDENT REPORTS

When an aircraft involved in an incident has a destination outside the area of responsibility of the ATS unit where the incident occurred, the ATS unit at the destination aerodrome should be notified and requested to obtain the pilot's report. The following information should be included in the message:

- a) type of incident (AIRPROX, procedure or facility);
 - b) identification of the aircraft concerned;
 - c) time and position at time of incident;
 - d) brief details of incident.
-

<i>Circumstances</i>	<i>Phraseologies</i>
... for multiple RVR observations	<p>e) RUNWAY VISUAL RANGE (or RVR) RUNWAY (number) NOT AVAILABLE (or NOT REPORTED);</p> <p>f) RUNWAY VISUAL RANGE (or RVR) [RUNWAY (number)] (first position) (distance) (units), (second position) (distance) (units), (third position) (distance) (units);</p> <p style="text-align: center;"><i>Note 1.— Multiple RVR observations are always representative of the touchdown zone, midpoint zone and the roll-out/stop end zone, respectively.</i></p> <p style="text-align: center;"><i>Note 2.— Where reports for three locations are given, the indication of these locations may be omitted, provided that the reports are passed in the order of touchdown zone, followed by the midpoint zone and ending with the roll-out/stop end zone report.</i></p>
... in the event that RVR information on any one position is not available this information will be included in the appropriate sequence	<p>g) RUNWAY VISUAL RANGE (or RVR) [RUNWAY (number)] (first position) (distance) (units), (second position) NOT AVAILABLE, (third position) (distance) (units);</p> <p>h) PRESENT WEATHER (details);</p> <p>i) CLOUD (amount, [(type)] and height of base) (units) (or SKY CLEAR);</p> <p style="text-align: center;"><i>Note.— Details of the means to describe the amount and type of cloud are in Chapter 11, 11.4.3.2.3.</i></p> <p>j) CAVOK;</p> <p style="text-align: center;"><i>Note.— CAVOK pronounced CAV-O-KAY.</i></p> <p>k) TEMPERATURE [MINUS] (number) (and/or DEWPOINT [MINUS] (number));</p> <p>l) QNH (number) [(units)];</p> <p>m) QFE (number) [(units)];</p> <p>n) (aircraft type) REPORTED (description) ICING (or TURBULENCE) [IN CLOUD] (area) (time);</p> <p>o) REPORT FLIGHT CONDITIONS.</p>
12.3.1.9 POSITION REPORTING	<p>a) NEXT REPORT AT (significant point);</p>

<i>Circumstances</i>	<i>Phraseologies</i>
... to omit position reports until a specified position	b) OMIT POSITION REPORTS [UNTIL (<i>specify</i>)]; c) RESUME POSITION REPORTING.
12.3.1.10 ADDITIONAL REPORTS	a) REPORT PASSING (<i>significant point</i>);
... to request a report at a specified place or distance	b) REPORT (<i>distance</i>) MILES (GNSS or DME) FROM (<i>name of DME station</i>) (<i>or significant point</i>);
... to report at a specified place or distance	*c) (<i>distance</i>) MILES (GNSS or DME) FROM (<i>name of DME station</i>) (<i>or significant point</i>);
	d) REPORT PASSING (<i>three digits</i>) RADIAL (<i>name of VOR</i>) VOR;
... to request a report of present position	e) REPORT (GNSS or DME) DISTANCE FROM (<i>significant point</i>) <i>or</i> (<i>name of DME station</i>);
... to report present position	*f) (<i>distance</i>) MILES (GNSS or DME) FROM (<i>name of DME station</i>) (<i>or significant point</i>).
	* Denotes pilot transmission.

Circumstances

12.3.1.11 AERODROME INFORMATION
(Applicable as of 5 November 2020)

Note 1.— See 11.4.3.4.3 for requirements for passing runway condition reports (RCRs) to pilots.

Note 2.— This information is provided for runway thirds or the full runway, as applicable.

Phraseologies

- a) [(location)] RUNWAY (number) SURFACE CONDITION [CODE (three digit number)]
- followed as necessary by:
- 1) ISSUED AT (date and time UTC);
 - 2) DRY, or WET ICE, or WATER ON TOP OF COMPACTED SNOW, or DRY SNOW, or DRY SNOW ON TOP OF ICE, or WET SNOW ON TOP OF ICE, or ICE, or SLUSH, or STANDING WATER, or COMPACTED SNOW, or WET SNOW, or DRY SNOW ON TOP OF COMPACTED SNOW, or WET SNOW ON TOP OF COMPACTED SNOW, or WET, or FROST;
 - 3) DEPTH ((depth of deposit) MILLIMETRES or NOT REPORTED);
 - 4) COVERAGE ((number) PER CENT or NOT REPORTED);
 - 5) ESTIMATED SURFACE FRICTION (GOOD, or GOOD TO MEDIUM, or MEDIUM, or MEDIUM TO POOR, or POOR, or LESS THAN POOR);
 - 6) AVAILABLE WIDTH (number) METRES;
 - 7) LENGTH REDUCED TO (number) METRES;
 - 8) DRIFTING SNOW;
 - 9) LOOSE SAND;
 - 10) CHEMICALLY TREATED;
 - 11) SNOWBANK (number) METRES [LEFT, or RIGHT, or LEFT AND RIGHT] [OF or FROM] CENTRELINE;
 - 12) TAXIWAY (identification of taxiway) SNOWBANK (number) METRES [LEFT, or RIGHT, or LEFT AND RIGHT] [OF or FROM] CENTRELINE;
 - 13) ADJACENT SNOWBANKS;
 - 14) TAXIWAY (identification of taxiway) POOR;
 - 15) APRON (identification of apron) POOR;
 - 16) Plain language remarks;

Circumstances

Phraseologies

	<ul style="list-style-type: none"> b) [(location)] RUNWAY SURFACE CONDITION RUNWAY (number) NOT CURRENT; c) LANDING SURFACE (condition); d) CAUTION CONSTRUCTION WORK (location); e) CAUTION (specify reasons) RIGHT (or LEFT), (or BOTH SIDES) OF RUNWAY [(number)]; f) CAUTION WORK IN PROGRESS (or OBSTRUCTION) (position and any necessary advice); g) BRAKING ACTION REPORTED BY (aircraft type) AT (time) GOOD (or GOOD TO MEDIUM, or MEDIUM, or MEDIUM TO POOR, or POOR); h) TAXIWAY (identification of taxiway) WET [or STANDING WATER, or SNOW REMOVED (length and width as applicable), or CHEMICALLY TREATED, or COVERED WITH PATCHES OF DRY SNOW (or WET SNOW, or COMPACTED SNOW, or SLUSH, or FROZEN SLUSH, or ICE, or WET ICE, or ICE UNDERNEATH, or ICE AND SNOW, or SNOWDRIFTS, or FROZEN RUTS AND RIDGES or LOOSE SAND)]; i) TOWER OBSERVES (weather information); j) PILOT REPORTS (weather information).
12.3.1.12 OPERATIONAL STATUS OF VISUAL AND NON-VISUAL AIDS	<ul style="list-style-type: none"> a) (specify visual or non-visual aid) RUNWAY (number) (description of deficiency); b) (type) LIGHTING (unserviceability); c) GBAS/SBAS/MLS/ILS CATEGORY (category) (serviceability state); d) TAXIWAY LIGHTING (description of deficiency); e) (type of visual approach slope indicator) RUNWAY (number) (description of deficiency).

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<i>Circumstances</i>	<i>Phraseologies</i>
12.3.1.13 REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATIONS	
... to ascertain RVSM approval status of an aircraft	a) CONFIRM RVSM APPROVED;
... to report RVSM approved status	*b) AFFIRM RVSM;
... to report RVSM non-approved status followed by supplementary information	*c) NEGATIVE RVSM [(supplementary information, e.g. State aircraft)];
<i>Note.— See 12.2.4 and 12.2.5 for procedures relating to operations in RVSM airspace by aircraft with non-approved status.</i>	
... to deny ATC clearance into RVSM airspace	d) UNABLE ISSUE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN [or DESCEND TO, or CLIMB TO] (level);
... to report when severe turbulence affects the capability of an aircraft to maintain height-keeping requirements for RVSM	*e) UNABLE RVSM DUE TURBULENCE;
... to report that the equipment of an aircraft has degraded below minimum aviation system performance standards	*f) UNABLE RVSM DUE EQUIPMENT;
...to request an aircraft to provide information as soon as RVSM-approved status has been regained or the pilot is ready to resume RVSM operations	g) REPORT WHEN ABLE TO RESUME RVSM;
... to request confirmation that an aircraft has regained RVSM-approved status or a pilot is ready to resume RVSM operations	h) CONFIRM ABLE TO RESUME RVSM;
... to report ability to resume RVSM operations after an equipment or weather-related contingency	*i) READY TO RESUME RVSM.
	* Denotes pilot transmission.

<i>Circumstances</i>	<i>Phraseologies</i>
12.3.4.5 TOWING PROCEDURES ... ATC response	†a) REQUEST TOW [company name] (aircraft type) FROM (location) TO (location); b) TOW APPROVED VIA (<i>specific routing to be followed</i>); c) HOLD POSITION; d) STAND BY. † Denotes transmission from aircraft/tow vehicle combination.
12.3.4.6 TO REQUEST TIME CHECK AND/OR AERODROME DATA FOR DEPARTURE ... when no ATIS broadcast is available	*a) REQUEST TIME CHECK; b) TIME (<i>time</i>); *c) REQUEST DEPARTURE INFORMATION; d) RUNWAY (<i>number</i>), WIND (<i>direction and speed</i>) (<i>units</i>) QNH (<i>or</i> QFE) (<i>number</i>) [(<i>units</i>)] TEMPERATURE [MINUS] (<i>number</i>), [VISIBILITY (<i>distance</i>) (<i>units</i>) (<i>or</i> RUNWAY VISUAL RANGE (<i>or</i> RVR) (<i>distance</i>) (<i>units</i>))] [TIME (<i>time</i>)]. <i>Note.— If multiple visibility and RVR observations are available, those that represent the roll-out/stop end zone should be used for take-off.</i> * Denotes pilot transmission.
12.3.4.7 TAXI PROCEDURES ... for departure ... where detailed taxi instructions are required	*a) [<i>aircraft type</i>] [<i>wake turbulence category if “super” or “heavy”</i>] [<i>aircraft location</i>] REQUEST TAXI [<i>intentions</i>]; *b) [<i>aircraft type</i>] [<i>wake turbulence category if “super” or “heavy”</i>] [<i>aircraft location</i>] (<i>flight rules</i>) TO (<i>aerodrome of destination</i>) REQUEST TAXI [<i>intentions</i>]; c) TAXI TO HOLDING POINT [<i>number</i>] [RUNWAY (<i>number</i>)] [HOLD SHORT OF RUNWAY (<i>number</i>) (<i>or</i> CROSS RUNWAY (<i>number</i>))] [TIME (<i>time</i>)]; *d) [<i>aircraft type</i>] [<i>wake turbulence category if “super” or “heavy”</i>] REQUEST DETAILED TAXI INSTRUCTIONS;

Circumstances	Phraseologies
... where aerodrome information is not available from an alternative source such as ATIS	e) TAXI TO HOLDING POINT [<i>number</i>] [RUNWAY (<i>number</i>)] VIA (<i>specific route to be followed</i>) [TIME (<i>time</i>)] [HOLD SHORT OF RUNWAY (<i>number</i>) (or CROSS RUNWAY (<i>number</i>))]; f) TAXI TO HOLDING POINT [<i>number</i>] (<i>followed by aerodrome information as applicable</i>) [TIME (<i>time</i>)]; g) TAKE (or TURN) FIRST (or SECOND) LEFT (or RIGHT); h) TAXI VIA (<i>identification of taxiway</i>); i) TAXI VIA RUNWAY (<i>number</i>); j) TAXI TO TERMINAL (or other location, e.g. GENERAL AVIATION AREA) [STAND (<i>number</i>)];
... for helicopter operations	*k) REQUEST AIR-TAXIING FROM (or VIA) TO (<i>location or routing as appropriate</i>); l) AIR-TAXI TO (or VIA) (<i>location or routing as appropriate</i>) [CAUTION (<i>dust, blowing snow, loose debris, taxiing light aircraft, personnel, etc.</i>)]; m) AIR TAXI VIA (<i>direct, as requested, or specified route</i>) TO (<i>location, heliport, operating or movement area, active or inactive runway</i>). AVOID (<i>aircraft or vehicles or personnel</i>);
... after landing	*n) REQUEST BACKTRACK; o) BACKTRACK APPROVED; p) BACKTRACK RUNWAY (<i>number</i>);
... general	*q) [(<i>aircraft location</i>)] REQUEST TAXI TO (<i>destination on aerodrome</i>); r) TAXI STRAIGHT AHEAD; s) TAXI WITH CAUTION; t) GIVE WAY TO (<i>description and position of other aircraft</i>); *u) GIVING WAY TO (<i>traffic</i>); *v) TRAFFIC (or type of aircraft) IN SIGHT; w) TAXI INTO HOLDING BAY; x) FOLLOW (<i>description of other aircraft or vehicle</i>);

15.2 SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES IN OCEANIC AIRSPACE

15.2.1 Introduction

15.2.1.1 Although all possible contingencies cannot be covered, the procedures in 15.2.2, 15.2.3 and 15.2.4 provide for the more frequent cases such as:

- a) the inability to comply with assigned clearance due to meteorological conditions (15.2.4 refers);
- b) en-route diversion across the prevailing traffic flow (for example, due to medical emergencies (15.2.2 and 15.2.3 refer)); and
- c) the loss of, or significant reduction in, the required navigation capability when operating in an airspace where the navigation performance accuracy is a prerequisite to the safe conduct of flight operations, or pressurization failure (15.2.2 and 15.2.3 refer).

Note.— Chapter 5, Section 5.2.2 contains procedures for degraded navigation capabilities.

15.2.1.2 The pilot shall take action as necessary to ensure the safety of the aircraft, and the pilot's judgement shall determine the sequence of actions to be taken, having regard to the prevailing circumstances. Air traffic control shall render all possible assistance.

15.2.2 General procedures

Note.— Figure 15-1 provides an aid for understanding and applying the contingency procedures contained in Sections 15.2.2 and 15.2.3.

15.2.2.1 If an aircraft is unable to continue the flight in accordance with its ATC clearance, a revised clearance shall be obtained, whenever possible, prior to initiating any action.

15.2.2.2 If prior clearance cannot be obtained, the following contingency procedures should be employed until a revised clearance is received. In general terms, the aircraft should be flown at an offset level and on an offset track where other aircraft are less likely to be encountered. Specifically, the pilot shall:

- a) leave the cleared track or ATS route by initially turning at least 30 degrees to the right or to the left, in order to establish and maintain a parallel, same direction track or ATS route offset 5.0 NM (9.3 km). The direction of the turn should be based on one or more of the following factors:
 - 1) aircraft position relative to any organized track or ATS route system;
 - 2) the direction of flights and flight levels allocated on adjacent tracks;
 - 3) the direction to an alternate airport;
 - 4) any strategic lateral offset being flown; and
 - 5) terrain clearance;

- b) maintain a watch for conflicting traffic both visually and by reference to ACAS (if equipped) , leaving ACAS in RA mode at all times, unless aircraft operating limitations dictate otherwise;
- c) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- d) keep the SSR transponder on at all times and, when able, squawk 7700, as appropriate and, if equipped with ADS-B or ADS-C, select the appropriate emergency functionality;
- e) as soon as practicable, advise air traffic control of any deviation from their assigned clearance;
- f) use means as appropriate (i.e. voice and/or CPDLC) to communicate during a contingency or emergency;
- g) if voice communications are used, the radiotelephony distress signal (MAYDAY) or urgency signal (PAN PAN) preferably spoken three times, shall be used, as appropriate;
- h) when emergency situations are communicated via CPDLC, the controller may respond via CPDLC. However, the controller may also attempt to make voice contact with the aircraft;

Note.— Guidance on emergency procedures for controllers, radio operators, and flight crew in data link operations can be found in the Global Operational Data Link (GOLD) Manual (Doc 10037).

- i) establish communications with and alert nearby aircraft by broadcasting on the frequencies in use and at suitable intervals on 121.5 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.45 MHz): aircraft identification, the nature of the distress condition, intention of the pilot, position (including the ATS route designator or the track code, as appropriate) and flight level; and
- j) the controller should attempt to determine the nature of the emergency and ascertain any assistance that may be required. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and overall traffic situation.

15.2.3 Actions to be taken once offset from track

Note.— The pilot's judgement of the situation and the need to ensure the safety of the aircraft will determine the actions outlined to be taken. Factors for the pilot to consider when deviating from the cleared track or ATS route or level without an ATC clearance include, but are not limited to:

- a) operation within a parallel track system;
- b) the potential for user preferred routes (UPRs) parallel to the aircraft's track or ATS route;
- c) the nature of the contingency (e.g. aircraft system malfunction); and
- d) weather factors (e.g. convective weather at lower flight levels).

15.2.3.1 If possible, maintain the assigned flight level until established on the 9.3 km (5.0 NM) parallel, same direction track or ATS route offset. If unable, initially minimize the rate of descent to the extent that is operationally feasible.

15.2.3.2 Once established on a parallel, same direction track or ATS route offset by 9.3 km (5.0 NM), either:

- a) descend below FL 290, and establish a 150 m (500 ft) vertical offset from those flight levels normally used, and proceed as required by the operational situation or if an ATC clearance has been obtained, in accordance with the clearance; or

Note 1.— Flight levels normally used are those contained in Annex 2 — Rules of the Air, Appendix 3.

Note 2.— Descent below FL 290 is considered particularly applicable to operations where there is a predominant traffic flow (e.g. east-west) or parallel track system where the aircraft's diversion path will likely cross adjacent tracks or ATS routes. A descent below FL 290 can decrease the likelihood of conflict with other aircraft, ACAS RA events and delays in obtaining a revised ATC clearance.

- b) establish a 150 m (500 ft) vertical offset (or 300 m (1000 ft) vertical offset if above FL 410) from those flight levels normally used, and proceed as required by the operational situation, or if an ATC clearance has been obtained, in accordance with the clearance.

Note.— Altimetry system errors (ASE) may result in less than 150 m (500 ft) vertical spacing (less than 300 m (1000 ft) above FL 410) when the above contingency procedure is applied.

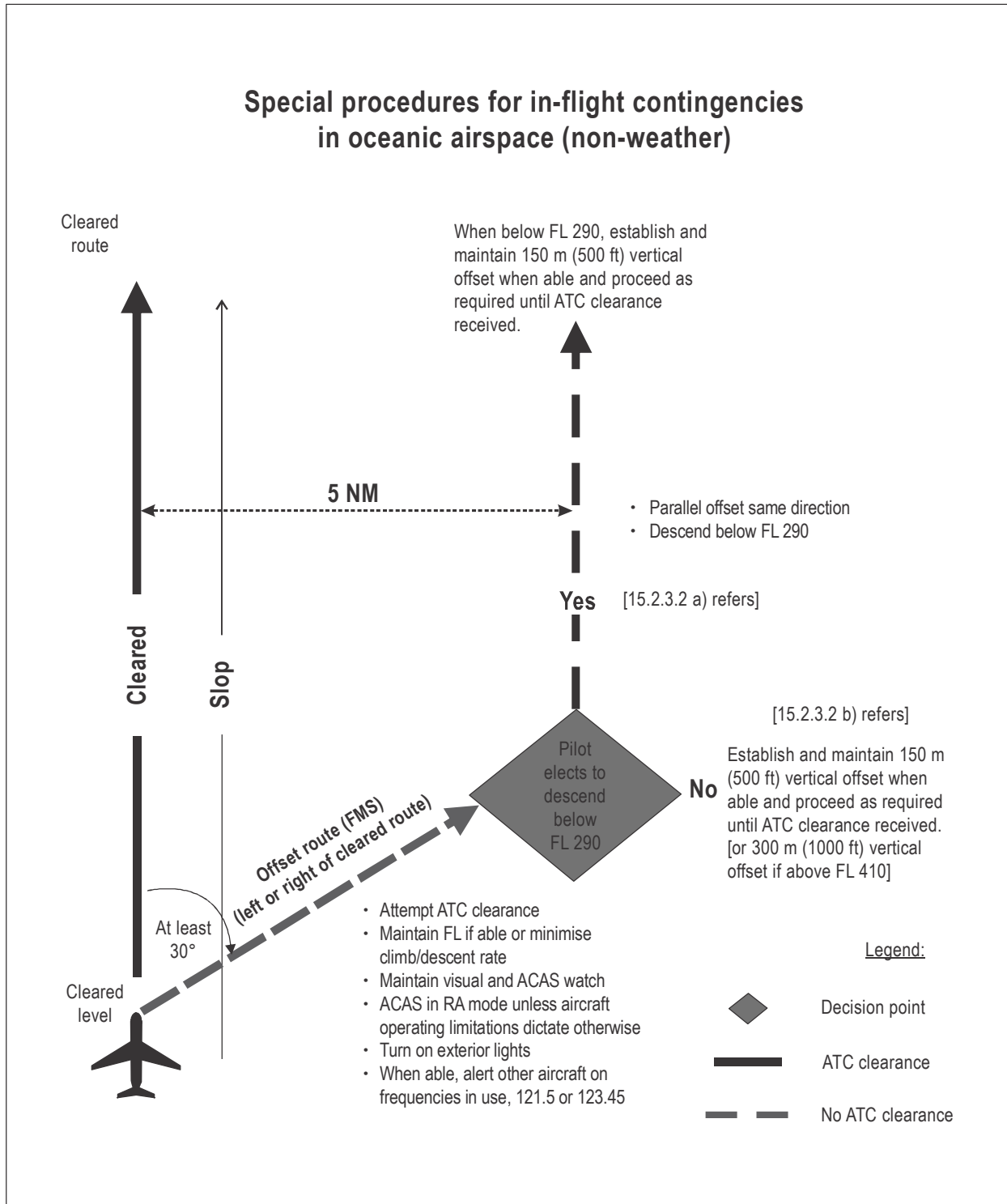


Figure 15-1. Visual aid for contingency procedures guidance

15.2.4 Weather deviation procedures

15.2.4.1 GENERAL

Note.— The following procedures are intended for deviations around adverse meteorological conditions.

15.2.4.1.1 When weather deviation is required, the pilot should initiate communications with ATC via voice or CPDLC. A rapid response may be obtained by either:

- a) stating “WEATHER DEVIATION REQUIRED” to indicate that priority is desired on the frequency and for ATC response; or
- b) requesting a weather deviation using a CPDLC lateral downlink message.

15.2.4.1.2 When necessary, the pilot should initiate the communications using the urgency call “PAN PAN” (preferably spoken three times) or by using a CPDCL urgency downlink message.

15.2.4.1.3 The pilot shall inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to its cleared route.

15.2.4.2 ACTIONS TO BE TAKEN WHEN CONTROLLER-PILOT COMMUNICATIONS ARE ESTABLISHED

15.2.4.2.1 The pilot should notify ATC and request clearance to deviate from track or ATS route, advising, when possible, the extent of the deviation requested. The flight crew will use whatever means are appropriate (i.e. voice and/or CPDLC) to communicate during a weather deviation.

Note.— Pilots are advised to contact ATC as soon as possible with requests for clearance in order to provide adequate time for the request to be assessed and acted upon.

15.2.4.2.2 ATC should take one of the following actions:

- a) when appropriate separation can be applied, issue clearance to deviate from track; or
- b) if there is conflicting traffic and ATC is unable to establish appropriate separation, ATC shall:
 - 1) advise the pilot of inability to issue clearance for the requested deviation;
 - 2) advise the pilot of conflicting traffic; and
 - 3) request the pilot’s intentions.

15.2.4.2.3 The pilot should take the following actions:

- a) comply with the ATC clearance issued; or
- b) advise ATC of intentions and execute the procedures detailed in 15.2.4.3.

15.2.4.3 ACTIONS TO BE TAKEN IF A REVISED
ATC CLEARANCE CANNOT BE OBTAINED

Note.— The provisions of this section apply to situations where a pilot needs to exercise the authority of a pilot-in-command under the provisions of Annex 2, 2.3.1.

15.2.4.3.1 If the aircraft is required to deviate from track or ATS route to avoid adverse meteorological conditions and prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time. Until an ATC clearance is received, the pilot shall take the following actions:

- a) if possible, deviate away from an organized track or ATS route system;
- b) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, position (including ATS route designator or the track code) and intentions, on the frequency in use and on 121.5 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.45 MHz);
- c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);
- d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- e) for deviations of less than 9.3 km (5.0 NM) from the originally cleared track or ATS route, remain at a level assigned by ATC;
- f) for deviations greater than, or equal to 9.3 km (5.0 NM) from the originally cleared track or ATS route, when the aircraft is approximately 9.3 km (5.0 NM) from track, initiate a level change in accordance with Table 15-1;
- g) if the pilot receives clearance to deviate from cleared track or ATS route for a specified distance and, subsequently, requests, but cannot obtain a clearance to deviate beyond that distance, the pilot should apply an altitude offset in accordance with Table 15-1 before deviating beyond the cleared distance;
- h) when returning to track or ATS route, be at its assigned flight level when the aircraft is within approximately 9.3 km (5.0 NM) of the centre line; and
- i) if contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.

Note.— If, as a result of actions taken under the provisions of 15.2.4.3.1, the pilot determines that there is another aircraft at or near the same flight level with which a conflict may occur, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

Table 15-1

<i>Originally cleared track or ATS route centre line</i>	<i>Deviations ≥ 9.3 km (5.0 NM)</i>	<i>Level change</i>
EAST (000° – 179° magnetic)	LEFT RIGHT	DESCEND 90 m (300 ft) CLIMB 90 m (300 ft)
WEST (180° – 359° magnetic)	LEFT RIGHT	CLIMB 90 m (300 ft) DESCEND 90 m (300 ft)

15.3 AIR-GROUND COMMUNICATIONS FAILURE

Note 1.— Procedures to be applied in relation to an aircraft experiencing air-ground communication failure when providing ATS surveillance services are contained in Chapter 8, Section 8.8.3.

Note 2.— An aircraft equipped with an SSR transponder is expected to operate the transponder on Mode A Code 7600 to indicate that it has experienced air-ground communication failure. An aircraft equipped with other surveillance system transmitters, including ADS-B and ADS-C, might indicate the loss of air-ground communication by all of the available means.

Note 3.— Some aircraft equipped with first generation ADS-B avionics have the capability to transmit a general emergency alert only, regardless of the code selected by the pilot.

Note 4.— See also Chapter 6, 6.3.2.5, concerning departure clearances containing no geographical or time limit for a cleared level below the flight planned level and procedures to be applied in relation to an aircraft experiencing air-ground communication failure under such circumstances.

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16.4.4.4 RPL PROCEDURES FOR ATS UNITS

The procedures for handling RPLs described herein are applicable regardless of whether automatic data-processing equipment is utilized or flight plan data is handled manually.

16.4.4.5 IMPLEMENTATION OF RPL PROCEDURES

16.4.4.5.1 Procedures for use of RPLs may be established for flights operating within a single FIR or a single State.

16.4.4.5.2 Procedures may also be established for flights across international boundaries subject to the provision that affected States currently utilize or will concurrently use RPLs.

16.4.4.5.3 Application of RPL procedures for international flights requires the establishment of bilateral or multilateral agreements between the States concerned. Multilateral agreements involving a number of States may take the form of regional air navigation agreements.

16.4.4.5.4 Application of RPLs requires agreements with participating operators to establish submission and amendment procedures.

16.4.4.5.5 Agreements shall include provisions for the following procedures:

- a) initial submission;
- b) permanent changes;
- c) temporary and incidental changes;
- d) cancellations;
- e) additions; and
- f) completely revised listings when indicated by extensive changes.

16.4.4.6 COLLECTION, STORAGE AND PROCESSING OF RPL DATA

16.4.4.6.1 Any State using RPLs shall designate one or more agencies responsible for administering such data. The area of responsibility for any such designated agency shall be at least one FIR. However, part or the entire area of responsibility of one or more States may be administered jointly by a designated agency. Each designated agency shall distribute relevant RPL data to the ATS units concerned within its area of responsibility so that such data reach these units in sufficient time to become effective.

16.4.4.6.2 RPLs shall be stored by each ATS unit concerned in a manner that will ensure that they are systematically activated on the appropriate day of operation in the order of estimated times indicative of entry into the unit's area of responsibility. Activation shall be accomplished in sufficient time to present the data to the controller in appropriate form for analysis and control action.

16.4.4.7 SUSPENSION OF RPL PROCEDURES

An appropriate ATS authority obliged, due to exceptional circumstances, to temporarily suspend the use of RPLs in its area of responsibility, or a specified part thereof, shall publish notice of such suspension with as much advance notice as possible and in the most suitable form considering the circumstances.

16.4.4.8 ATS MESSAGES RELATED TO INDIVIDUAL FLIGHTS OPERATING ON AN RPL

ATS messages relating to individual flights operating on an RPL shall be originated and addressed to ATS units concerned in a manner identical to that used for flights operating on individual flight plans.

16.5 STRATEGIC LATERAL OFFSET PROCEDURES (SLOP)

Note 1.— SLOP are approved procedures that allow aircraft to fly on a parallel track to the right of the centre line relative to the direction of flight to mitigate the lateral overlap probability due to increased navigation accuracy and wake turbulence encounters. Unless specified in the separation standard, an aircraft's use of these procedures does not affect the application of prescribed separation standards.

Note 2.— Annex 2, 3.6.2.1.1, requires authorization for the application of strategic lateral offsets from the appropriate ATS authority responsible for the airspace concerned.

16.5.1 Implementation of strategic lateral offset procedures shall be coordinated among the States involved.

Note.— Information concerning the implementation of strategic lateral offset procedures is contained in the Implementation of Strategic Lateral Offset Procedures (Circular 354).

16.5.2 Strategic lateral offsets shall be authorized only in en-route airspace as follows:

- a) where the lateral separation minima or spacing between route centre lines is 28 km (15 NM) or more, offsets to the right of the centre line relative to the direction of flight in tenths of a nautical mile up to a maximum of 3.7 km (2 NM); and
- b) where the lateral separation minima or spacing between route centre lines is 19 km (10 NM) or more and less than 28 km (15 NM), while one aircraft climbs/descends through the level of another aircraft, offsets to the right of the centre line relative to the direction of flight in tenths of a nautical mile up to a maximum of 3.7 km (2 NM); and
- c) where the lateral separation minima or spacing between route centre lines is 11.1 km (6 NM) or more and less than 28 km (15 NM), offsets to the right of the centre line relative to the direction of flight in tenths of a nautical mile up to a maximum of 0.9 km (0.5 NM).

Note.— Refer to 5.4.1.2.1.6 for lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes.

16.5.3 The routes or airspace where application of strategic lateral offsets is authorized, and the procedures to be followed by pilots, shall be promulgated in aeronautical information publications (AIPs). In some instances, it may be necessary to impose restrictions on the use of strategic lateral offsets, e.g. where their application may be inappropriate for reasons related to obstacle clearance. Route conformance monitoring systems shall account for the application of SLOP.

16.5.4 The decision to apply a strategic lateral offset shall be the responsibility of the flight crew. The flight crew shall only apply strategic lateral offsets in airspace where such offsets have been authorized by the appropriate ATS authority and when the aircraft is equipped with automatic offset tracking capability.

Note 1.— Pilots may contact other aircraft on the inter-pilot air-to-air frequency 123.45 MHz to coordinate offsets.

Note 2.— The strategic lateral offset procedure has been designed to include offsets to mitigate the effects of wake turbulence of preceding aircraft. If wake turbulence needs to be avoided, an offset to the right and within the limits specified in 16.5.2 may be used.

Note 3.— Pilots are not required to inform ATC that a strategic lateral offset is being applied.

16.6 NOTIFICATION OF SUSPECTED COMMUNICABLE DISEASES, OR OTHER PUBLIC HEALTH RISK, ON BOARD AN AIRCRAFT

16.6.1 The flight crew of an en-route aircraft shall, upon identifying a suspected case(s) of communicable disease, or other public health risk, on board the aircraft, promptly notify the ATS unit with which the pilot is communicating, the information listed below:

- a) aircraft identification;
- b) departure aerodrome;
- c) destination aerodrome;
- d) estimated time of arrival;
- e) number of persons on board;
- f) number of suspected case(s) on board; and
- g) nature of the public health risk, if known.

16.6.2 The ATS unit, upon receipt of information from a pilot regarding suspected case(s) of communicable disease, or other public health risk, on board the aircraft, shall forward a message as soon as possible to the ATS unit serving the destination/departure, unless procedures exist to notify the appropriate authority designated by the State and the aircraft operator or its designated representative.

16.6.3 When a report of a suspected case(s) of communicable disease, or other public health risk, on board an aircraft is received by an ATS unit serving the destination/departure, from another ATS unit or from an aircraft or an aircraft operator, the unit concerned shall forward a message as soon as possible to the public health authority (PHA) or the appropriate authority designated by the State as well as the aircraft operator or its designated representative, and the aerodrome authority.

Note 1.— See Annex 9 — Facilitation, Chapter 1 (Definitions), Chapter 8, 8.12 and 8.15, and Appendix 1, for relevant additional information related to the subject of communicable disease and public health risk on board an aircraft.

Note 2.— The PHA is expected to contact the airline representative or operating agency and aerodrome authority, if applicable, for subsequent coordination with the aircraft concerning clinical details and aerodrome preparation. Depending on the communications facilities available to the airline representative or operating agency, it may not be possible to communicate with the aircraft until it is closer to its destination. Apart from the initial notification to the ATS unit whilst en-route, ATC communications channels are to be avoided.

Note 3.— The information to be provided to the departure aerodrome will prevent the potential spread of communicable disease, or other public health risk, through other aircraft departing from the same aerodrome.

Note 4.— AFTN (urgency message), telephone, facsimile or other means of transmission may be used.

Appendix 1

INSTRUCTIONS FOR AIR-REPORTING BY VOICE COMMUNICATIONS

1. Reporting instructions
2. Special air-report of volcanic activity form (Model VAR)
3. Examples

1. Reporting instructions

MODEL AIREP SPECIAL

ITEM	PARAMETER	TRANSMIT IN TELEPHONY as appropriate
—	Message-type designator: • special air-report	[AIREP] SPECIAL

Section 1	1	Aircraft identification	<i>(aircraft identification)</i>
	2	Position	POSITION <i>(latitude and longitude)</i> OVER <i>(significant point)</i> ABEAM <i>(significant point)</i> <i>(significant point) (bearing) (distance)</i>
	3	Time	<i>(time)</i>
	4	Level	FLIGHT LEVEL <i>(number)</i> or <i>(number)</i> METRES or FEET CLIMBING TO FLIGHT LEVEL <i>(number)</i> or <i>(number)</i> METRES or FEET DESCENDING TO FLIGHT LEVEL <i>(number)</i> or <i>(number)</i> METRES or FEET
	5	Next position and estimated time over	<i>(position) (time)</i>
	6	Ensuing significant point	<i>(position)</i> NEXT
Section 2	7	Estimated time of arrival	<i>(aerodrome) (time)</i>
	8	Endurance	ENDURANCE <i>(hours and minutes)</i>
Section 3	9	Phenomenon encountered or observed, prompting a special air-report: <ul style="list-style-type: none"> • Moderate turbulence • Severe turbulence • Moderate icing • Severe icing • Severe mountainwave • Thunderstorms without hail • Thunderstorms with hail • Heavy dust/sandstorm • Volcanic ash cloud • Pre-eruption volcanic activity or volcanic eruption Runway braking action <i>(Applicable as of 5 November 2020)</i> <ul style="list-style-type: none"> • Good • Good to Medium • Medium • Medium to Poor • Poor • Less than Poor 	TURBULENCE MODERATE TURBULENCE SEVERE ICING MODERATE ICING SEVERE MOUNTAINWAVE SEVERE THUNDERSTORMS THUNDERSTORMS WITH HAIL DUSTSTORM or SANDSTORM HEAVY VOLCANIC ASH CLOUD PRE-ERUPTION VOLCANIC ACTIVITY or VOLCANIC ERUPTION GOOD GOOD TO MEDIUM MEDIUM MEDIUM TO POOR POOR LESS THAN POOR

1. Position reports and special air-reports

1.1 Section 1 is obligatory for position reports and special air-reports, although Items 5 and 6 thereof may be omitted when prescribed in *Regional Supplementary Procedures*; Section 2 shall be added, in whole or in part, only when so requested by the operator or its designated representative, or when deemed necessary by the pilot-in-command; Section 3 shall be included in special air-reports.

1.2 Special air-reports shall be made whenever any of the phenomena listed under Item 15 are observed or encountered. Items 1 to 4 of Section 1 and the appropriate phenomenon specified in Section 3, Item 15, are required from all aircraft. The phenomena listed under "SST" shall be reported only by supersonic transport at transonic and supersonic cruising levels.

1.3 In the case of special air-reports containing information on volcanic activity, a post-flight report shall be made on the volcanic activity reporting form (Model VAR). All elements which are observed shall be recorded and indicated respectively in the appropriate places on the form Model VAR.

1.4 Special air-reports shall be made as soon as practicable after a phenomenon calling for a special air-report has been observed.

1.5 If a phenomenon warranting the making of a special air-report is observed at or near the time or place where a routine air-report is to be made, a special air-report shall be made instead.

2. Detailed reporting instructions

2.1 Items of an air-report shall be reported in the order in which they are listed in the model AIREP SPECIAL form.

— MESSAGE TYPE DESIGNATOR. Report "SPECIAL" for a special air-report.

Section 1

Item 1 — AIRCRAFT IDENTIFICATION. Report the aircraft radiotelephony call sign as prescribed in Annex 10, Volume II, Chapter 5.

Item 2 — POSITION. Report position in latitude (degrees as 2 numerics or degrees and minutes as 4 numerics, followed by "North" or "South") and longitude (degrees as 3 numerics or degrees and minutes as 5 numerics, followed by "East" or "West"), or as a significant point identified by a coded designator (2 to 5 characters), or as a significant point followed by magnetic bearing (3 numerics) and distance in nautical miles from the point (e.g. "4620North07805West", "4620North07800West", "4600North07800West", LN ("LIMA NOVEMBER"), "MAY", "HADDY" or "DUB 180 DEGREES 40 MILES"). Precede significant point by "ABEAM", if applicable.

Item 3 — TIME. Report time in hours and minutes UTC (4 numerics) unless reporting time in minutes past the hour (2 numerics) is prescribed on the basis of regional air navigation agreements. The time reported must be the actual time of the aircraft at the position and not the time of origination or transmission of the report. Time shall always be reported in hours and minutes UTC when making a special air-report.

Item 4 — FLIGHT LEVEL OR ALTITUDE. Report flight level by 3 numerics (e.g. "FLIGHT LEVEL 310"), when on standard pressure altimeter setting. Report altitude in metres followed by "METRES" or in feet followed by "FEET", when on QNH. Report "CLIMBING" (followed by the level) when climbing, or "DESCENDING" (followed by the level) when descending, to a new level after passing the significant point.

Item 5 — NEXT POSITION AND ESTIMATED TIME OVER. Report the next reporting point and the estimated time over such reporting point, or report the estimated position that will be reached one hour later, according to the position reporting procedures in force. Use the data conventions specified in Item 2 for position. Report the estimated time over this position. Report time in hours and minutes UTC (4 numerics) unless reporting time in minutes past the hour (2 numerics) as prescribed on the basis of regional air navigation agreements.

Item 6 — ENSUING SIGNIFICANT POINT. Report the ensuing significant point following the "next position and estimated time over".

Section 2

Item 7 — ESTIMATED TIME OF ARRIVAL. Report the name of the aerodrome of the first intended landing, followed by the estimated time of arrival at this aerodrome in hours and minutes UTC (4 numerics).

Item 8 — ENDURANCE. Report "ENDURANCE" followed by fuel endurance in hours and minutes (4 numerics).

Section 3

Item 9 — PHENOMENON PROMPTING A SPECIAL AIR-REPORT. Report one of the following phenomena encountered or observed:

- moderate turbulence as "TURBULENCE MODERATE"
severe turbulence as "TURBULENCE SEVERE"

The following specifications apply:

Moderate — Conditions in which moderate changes in aircraft attitude and/or altitude may occur but the aircraft remains in positive control at all times. Usually, small variations in airspeed. Changes in accelerometer readings of 0.5 g to 1.0 g at the aircraft's centre of gravity. Difficulty in walking. Occupants feel strain against seat belts. Loose objects move about.

Severe — Conditions in which abrupt changes in aircraft attitude and/or altitude occur; aircraft may be out of control for short periods. Usually, large variations in airspeed. Changes in accelerometer readings greater than 1.0 g at the aircraft's centre of gravity. Occupants are forced violently against seat belts. Loose objects are tossed about.

- moderate icing as "ICING MODERATE"
severe icing as "ICING SEVERE"

The following specifications apply:

Moderate — Conditions in which change of heading and/or altitude may be considered desirable.

Severe — Conditions in which immediate change of heading and/or altitude is considered essential.

- Severe mountainwave as "MOUNTAINWAVE SEVERE"

The following specification applies:

Severe — Conditions in which the accompanying downdraft is 3.0 m/s (600 ft/min) or more and/or severe turbulence is encountered.

- thunderstorm without hail as "THUNDERSTORM"
thunderstorm with hail as "THUNDERSTORM WITH HAIL"

The following specification applies:

Only report those thunderstorms which are:

- obscured in haze; or
- embedded in cloud; or
- widespread; or
- forming a squall-line.

- heavy duststorm or sandstorm as "DUSTSTORM or SANDSTORM HEAVY"
- volcanic ash cloud as "VOLCANIC ASH CLOUD"
- pre-eruption volcanic activity or a volcanic eruption as "PRE-ERUPTION VOLCANIC ACTIVITY or VOLCANIC ERUPTION"

The following specification applies:

Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

Note.— In case of volcanic ash cloud, pre-eruption volcanic activity or volcanic eruption, in accordance with Chapter 4, 4.12.3, a post-flight report shall also be made on the special air-report of volcanic activity form (Model VAR).

As of 5 November 2020:

- **Good braking action as "BRAKING ACTION GOOD"**

- Good to medium braking action as "BRAKING ACTION GOOD TO MEDIUM"
- Medium braking action as "BRAKING ACTION MEDIUM"
- Medium to poor braking action as "BRAKING ACTION MEDIUM TO POOR"
- Poor braking action as "BRAKING ACTION POOR"
- Less than poor braking action as "BRAKING ACTION LESS THAN POOR"

The following specifications apply:

Good — Braking deceleration is normal for the wheel braking effort applied and directional control is normal.

Good to medium — Braking deceleration or directional control is between Good and Medium.

Medium — Braking deceleration is noticeably reduced for the wheel braking effort applied or directional control is noticeably reduced.

Medium to poor — Braking deceleration or directional control is between Medium and Poor.

Poor — Braking deceleration is significantly reduced for the wheel braking effort applied or directional control is significantly reduced.

Less than poor — Braking deceleration is minimal to non-existent for the wheel braking effort applied or directional control is uncertain.

2.2 Information recorded on the volcanic activity reporting form (Model VAR) is not for transmission by RTF but, on arrival at an aerodrome, is to be delivered without delay by the operator or a flight crew member to the aerodrome meteorological office. If such an office is not easily accessible, the completed form shall be delivered in accordance with local arrangements made between the meteorological and ATS authorities and the operator.

3. Forwarding of meteorological information received by voice communications

When receiving special air-reports, air traffic services units shall forward these air-reports without delay to the associated meteorological watch office (MWO). In order to ensure assimilation of air-reports in ground-based automated systems, the elements of such reports shall be transmitted using the data conventions specified below and in the order prescribed.

- ADDRESSEE. Record station called and, when necessary, relay required.
- MESSAGE TYPE DESIGNATOR. Record "ARS" for a special air-report.

Note.— Where air-reports are handled by automatic data processing equipment which cannot accept this message-type designator, in accordance with Chapter 11, 11.4.2.6.5.2, the use of a different message-type designator is permitted by regional air navigation agreement.

- AIRCRAFT IDENTIFICATION. Record the aircraft identification using the data convention specified for Item 7 of the flight plan, without a space between the operator's designator and the aircraft registration or flight identification, if used (e.g. New Zealand 103 as ANZ103).

Section 1

Item 0 — POSITION. Record position in latitude (degrees as 2 numerics or degrees and minutes as 4 numerics, followed without a space by N or S) and longitude (degrees as 3 numerics or degrees and minutes as 5 numerics, followed without a space by E or W), or as a significant point identified by a coded designator (2 to 5 characters), or as a significant point followed by magnetic bearing (3 numerics) and distance in nautical miles (3 numerics) from the point (e.g. 4620N07805W, 4620N078W, 46N078W, LN, MAY, HADDY or DUB180040). Precede significant point by "ABM" (abeam), if applicable.

Item 1 — TIME. Record time in hours and minutes UTC (4 numerics).

Item 2 — FLIGHT LEVEL OR ALTITUDE. Record F followed by 3 numerics (e.g. F310), when a flight level is reported. Record altitude in metres followed by M or in feet followed by FT, when an altitude is reported. Record "ASC" (level) when climbing, or "DES" (level) when descending.

Section 3

Item 9 — PHENOMENON PROMPTING A SPECIAL AIR-REPORT. Record the phenomenon reported as follows:

- moderate turbulence as "TURB MOD"
- severe turbulence as "TURB SEV"
- moderate icing as "ICE MOD"
- severe icing as "ICE SEV"
- severe mountainwave as "MTW SEV"
- thunderstorm without hail as "TS"
- thunderstorm with hail as "TSGR"
- heavy sandstorm as "HVV SS"
- heavy duststorm as "HVV DS"
- volcanic ash cloud as "VA CLD"
- pre-eruption volcanic activity or a volcanic eruption as "VA"
- hail as "GR"
- cumulonimbus clouds as "CB".

— TIME TRANSMITTED. Record only when Section 3 is transmitted.

2. Special air-report of volcanic activity form (Model VAR)

MODEL VAR: to be used for post-flight reporting

VOLCANIC ACTIVITY REPORT

Air-reports are critically important in assessing the hazards which volcanic ash cloud presents to aircraft operations.

OPERATOR:			A/C IDENTIFICATION: (as indicated on flight plan)		
PILOT-IN-COMMAND:					
DEP FROM:	DATE:	TIME; UTC:	ARR AT:	DATE:	TIME; UTC:
ADDRESSEE			AIREP SPECIAL		
Items 1–8 are to be reported immediately to the ATS unit that you are in contact with.					
1) AIRCRAFT IDENTIFICATION			2) POSITION		
3) TIME			4) FLIGHT LEVEL OR ALTITUDE		
5) VOLCANIC ACTIVITY OBSERVED AT (position or bearing, estimated level of ash cloud and distance from aircraft)					
6) AIR TEMPERATURE			7) SPOT WIND		
8) SUPPLEMENTARY INFORMATION			Other _____		
SO ₂ detected Yes <input type="checkbox"/> No <input type="checkbox"/>					
Ash encountered Yes <input type="checkbox"/> No <input type="checkbox"/>			(Brief description of activity especially vertical and lateral extent of ash cloud and, where possible, horizontal movement, rate of growth, etc.)		
After landing complete items 9–16 then fax form to: (Fax number to be provided by the meteorological authority based on local arrangements between the meteorological authority and the operator concerned.)					
9) DENSITY OF ASH CLOUD		<input type="checkbox"/> (a) Wispy	<input type="checkbox"/> (b) Moderate dense	<input type="checkbox"/> (c) Very dense	
10) COLOUR OF ASH CLOUD		<input type="checkbox"/> (a) White	<input type="checkbox"/> (b) Light grey	<input type="checkbox"/> (c) Dark grey	
		<input type="checkbox"/> (d) Black	<input type="checkbox"/> (e) Other _____		
11) ERUPTION		<input type="checkbox"/> (a) Continuous	<input type="checkbox"/> (b) Intermittent	<input type="checkbox"/> (c) Not visible	
12) POSITION OF ACTIVITY		<input type="checkbox"/> (a) Summit	<input type="checkbox"/> (b) Side	<input type="checkbox"/> (c) Single	
		<input type="checkbox"/> (d) Multiple	<input type="checkbox"/> (e) Not observed		
13) OTHER OBSERVED FEATURES OF ERUPTION		<input type="checkbox"/> (a) Lightning	<input type="checkbox"/> (b) Glow	<input type="checkbox"/> (c) Large rocks	
		<input type="checkbox"/> (d) Ash fallout	<input type="checkbox"/> (e) Mushroom cloud	<input type="checkbox"/> (f) All	
14) EFFECT ON AIRCRAFT		<input type="checkbox"/> (a) Communication	<input type="checkbox"/> (b) Navigation systems	<input type="checkbox"/> (c) Engines	
		<input type="checkbox"/> (d) Pitot static	<input type="checkbox"/> (e) Windscreen	<input type="checkbox"/> (f) Windows	
15) OTHER EFFECTS		<input type="checkbox"/> (a) Turbulence	<input type="checkbox"/> (b) St. Elmo's Fire	<input type="checkbox"/> (c) Other fumes	
16) OTHER INFORMATION (Any information considered useful.)					

3. Examples

AS SPOKEN IN RADIOTELEPHONY

I.¹ AIREP SPECIAL CLIPPER WUN ZERO WUN
POSITION FIFE ZERO FOWer FIFE NORTH ZERO
TOO ZERO WUN FIFE WEST WUN FIFE TREE
SIX FLIGHT LEVEL TREE WUN ZERO
CLIMBING TO FLIGHT LEVEL TREE FIFE ZERO
THUNDERSTORMS WITH HAIL

II.² SPECIAL NIUGINI TOO SEVen TREE OVER
MADANG ZERO AIT FOWer SIX WUN NINer
TOUSAND FEET TURBULENCE SEVERE

AS RECORDED BY THE AIR TRAFFIC SERVICES UNIT AND FORWARDED TO THE METEOROLOGICAL OFFICE CONCERNED

I.- ARS PAA101 5045N02015W 1536 F310 ASC F350
TSGR

II.- ARS ANG273 MD 0846 19000FT TURB SEV

1. A special air-report which is required because of the occurrence of widespread thunderstorms with hail.

2. A special air-report which is required because of severe turbulence. The aircraft is on QNH altimeter setting.

Type of aircraft (2 to 4 characters)

INSERT the appropriate designator as specified in Doc 8643, *Aircraft Type Designators*,

OR, if no such designator has been assigned, or in case of formation flights comprising more than one type,

INSERT ZZZZ, and *SPECIFY* in Item 18, the (numbers and) type(s) of aircraft preceded by TYP/ .

Wake turbulence category (1 character)
--

INSERT an oblique stroke followed by one of the following letters to indicate the wake turbulence category of the aircraft:

J — SUPER, to indicate an aircraft type specified as such in Doc 8643, *Aircraft Type Designators*;

H — HEAVY, to indicate an aircraft type with a maximum certificated take-off mass of 136 000 kg or more, with the exception of aircraft types listed in Doc 8643 in the SUPER (J) category;

M — MEDIUM, to indicate an aircraft type with a maximum certificated take-off mass of less than 136 000 kg but more than 7 000 kg;

L — LIGHT, to indicate an aircraft type with a maximum certificated take-off mass of 7 000 kg or less.

ITEM 10: EQUIPMENT AND CAPABILITIES
--

Capabilities comprise the following elements:

- a) presence of relevant serviceable equipment on board the aircraft;
- b) equipment and capabilities commensurate with flight crew qualifications; and
- c) where applicable, authorization from the appropriate authority.

Radiocommunication, navigation and approach aid equipment and capabilities
--

INSERT one letter as follows:

N if no COM/NAV/approach aid equipment for the route to be flown is carried, or the equipment is unserviceable,

OR S if standard COM/NAV/approach aid equipment for the route to be flown is carried and serviceable (*see Note 1*),

AND/OR

INSERT one or more of the following letters to indicate the serviceable COM/NAV/approach aid equipment and capabilities available:

A	GBAS landing system	J6	CPDLC FANS 1/A
B	LPV (APV with SBAS)		SATCOM (MTSAT)
C	LORAN C	J7	CPDLC FANS 1/A SATCOM
D	DME		(Iridium)
E1	FMC WPR ACARS	K	MLS
E2	D-FIS ACARS	L	ILS
E3	PDC ACARS	M1	ATC SATVOICE (INMARSAT)
F	ADF	M2	ATC SATVOICE (MTSAT)
G	GNSS. If any portion of the flight is planned to be conducted under IFR, it refers to GNSS receivers that comply with the requirements of Annex 10, Volume I (See Note 2)	M3	ATC SATVOICE (Iridium)
		O	VOR
		P1	CPDLC RCP 400 (See Note 7)
		P2	CPDLC RCP 240 (See Note 7)
		P3	SATVOICE RCP 400 (See Note 7)
		P4-P9	Reserved for RCP
H	HF RTF	R	PBN approved (See Note 4)
I	Inertial Navigation	T	TACAN
J1	CPDLC ATN VDL Mode 2 (See Note 3)	U	UHF RTF
J2	CPDLC FANS 1/A HFDL	V	VHF RTF
J3	CPDLC FANS 1/A VDL Mode A	W	RVSM approved
J4	CPDLC FANS 1/A VDL Mode 2	X	MNPS approved
J5	CPDLC FANS 1/A SATCOM (INMARSAT)	Y	VHF with 8.33 kHz channel spacing capability
		Z	Other equipment carried or other capabilities (See Note 5)

Any alphanumeric characters not indicated above are reserved.

Note 1.— If the letter S is used, standard equipment is considered to be VHF RTF, VOR and ILS, unless another combination is prescribed by the appropriate ATS authority.

Note 2.— If the letter G is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator NAV/ and separated by a space.

Note 3.— See RTCA/EUROCAE Interoperability Requirements Standard for ATN Baseline 1 (ATN B1 INTEROP Standard – DO-280B/ED-110B) for data link services air traffic control clearance and information/air traffic control communications management/air traffic control microphone check.

Note 4.— If the letter R is used, the performance-based navigation levels that can be met are specified in Item 18 following the indicator PBN/. Guidance material on the application of performance-based navigation to a specific route segment, route or area is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

Note 5.— If the letter Z is used, specify in Item 18 the other equipment carried or other capabilities, preceded by COM/ , NAV/ and/or DAT, as appropriate.

Note 6.— Information on navigation capability is provided to ATC for clearance and routing purposes.

Note 7.— Guidance material on the application of performance-based communication, which prescribes RCP to an air traffic service in a specific area, is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

ITEM I: VALID FROM

INSERT first date (year, month, day) upon which the flight is scheduled to operate.

ITEM J: VALID UNTIL

INSERT last date (year, month, day) upon which the flight is scheduled to operate as listed, or
UFN if the duration is unknown.

ITEM K: DAYS OF OPERATION

INSERT number corresponding to the day of the week in the appropriate column;
Monday = 1 through Sunday = 7.

INSERT 0 for each day of non-operation in the appropriate column.

ITEM L: AIRCRAFT IDENTIFICATION

(Item 7 of the ICAO flight plan)

INSERT aircraft identification to be used for the flight.

**ITEM M: TYPE OF AIRCRAFT AND
WAKE TURBULENCE CATEGORY**

(Item 9 of the ICAO flight plan)

INSERT appropriate ICAO designator as specified in Doc 8643 — *Aircraft Type Designators*.

INSERT J, H, M or L indicator as appropriate:

J — SUPER, to indicate an aircraft type specified as such in Doc 8643, *Aircraft Type Designators*;

H — HEAVY to indicate an aircraft type with a maximum certificated take-off mass of 136 000 kg or more, with the exception of aircraft types listed in Doc 8643 in the SUPER (J) category;

M — MEDIUM to indicate an aircraft type with a maximum certificated take-off mass of less than 136 000 kg but more than 7 000 kg;

L — LIGHT to indicate an aircraft type with a maximum certificated take-off mass of 7 000 kg or less.

ITEM N: DEPARTURE AERODROME AND TIME

(Item 13 of the ICAO flight plan)

INSERT location indicator of the departure aerodrome.

INSERT the off-block time, i.e. the estimated time that the aircraft will commence movement associated with departure.

ITEM O: ROUTE

(Item 15 of the ICAO flight plan)

(a) Cruising speed

INSERT the true airspeed for the first or whole cruising portion of the flight in accordance with Item 15 (a) of the ICAO flight plan.

(b) Cruising level

INSERT the planned cruising level for the first or whole portion of the route in accordance with Item 15 (b) of the ICAO flight plan.

(c) Route

INSERT the entire route in accordance with Item 15 (c) of the ICAO flight plan.

**ITEM P: DESTINATION AERODROME AND
TOTAL ESTIMATED ELAPSED TIME**

(Item 16 of the ICAO flight plan)

INSERT location indicator of the destination aerodrome.

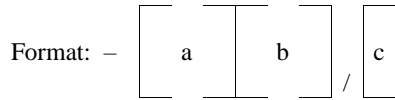
INSERT the total estimated elapsed time.

ITEM Q: REMARKS

INSERT items of information as required by the appropriate ATS authority, items normally notified in Item 18 of the ICAO flight plan and any other information pertinent to the flight of concern to ATS.

Field Type 9 — Number and type of aircraft and wake turbulence category

FIELD TYPE 9



Previous type of field or symbol	This type of field is used in	Next type of field or symbol
8	ALR	10
8	FPL	10
8	CPL	10

SINGLE HYPHEN

(a) *Number of aircraft (if more than one)*

Note.— This element is included only in the case of formation flights.

1 OR 2 NUMERICS giving the number of aircraft in the flight.

(b) *Type of aircraft*

2 to 4 CHARACTERS, being the appropriate designator chosen from Doc 8643, *Aircraft Type Designators*, or

ZZZZ if no designator has been assigned or if there is more than one type of aircraft in the flight.

Note.— If the letters ZZZZ are used, the type(s) of aircraft is (are) to be shown in the Other Information Field (see Field Type 18).

OBLIQUE STROKE

(c) *Wake turbulence category*

1 LETTER to indicate wake turbulence category of the aircraft:

J — Super
 H — Heavy
 M — Medium
 L — Light

- Examples: —DC3/M
 —B707/M
 —2FK27/M
 —ZZZZ/L
 —3ZZZZ/L
 —B747/H

Field Type 10 — Equipment and capabilities

FIELD TYPE 10

Format: — a / b

SINGLE HYPHEN

Previous type of field or symbol	This type of field is used in	Next type of field or symbol
9	ALR	13
9	FPL	13
9	CPL	13

(a) *Radiocommunication, navigation and approach aid equipment and capabilities*

1 LETTER as follows:

N no COM/NAV/approach aid equipment for the route to be flown is carried, or the equipment is unserviceable

OR S Standard COM/NAV/approach aid equipment for the route to be flown is carried and serviceable (*see Note 1*)

AND/OR ONE OR MORE OF THE FOLLOWING LETTERS to indicate the serviceable COM/NAV/approach aid equipment and capabilities

A	GBAS landing system	J7	CPDLC FANS 1/A
B	LPV (APV with SBAS)		SATCOM (Iridium)
C	LORAN C	K	MLS
D	DME	L	ILS
E1	FMC WPR ACARS	M1	ATC SATVOICE
E2	D-FIS ACARS		(INMARSAT)
E3	PDC ACARS	M2	ATC SATVOICE (MTSAT)
F	ADF	M3	ATC SATVOICE (Iridium)
G	GNSS. If any portion of the flight is planned to be conducted under IFR, it refers to GNSS receivers that comply with the requirements of Annex 10, Volume I (<i>See Note 2</i>)	O	VOR
		P1	CPDLC RCP 400 (<i>see Note 7</i>)
		P2	CPDLC RCP 240 (<i>see Note 7</i>)
		P3	SATVOICE RCP 400 (<i>see Note 7</i>)
		P4–P9	Reserved for RCP
H	HF RTF	R	PBN approved (<i>see Note 4</i>)
I	Inertial navigation	T	TACAN
J1	CPDLC ATN VDL Mode 2 (<i>see Note 3</i>)	U	UHF RTF
		V	VHF RTF
J2	CPDLC FANS 1/A HFDL	W	RVSM approved
J3	CPDLC FANS 1/A VDL Mode A	X	MNPS approved
J4	CPDLC FANS 1/A VDL Mode 2	Y	VHF with 8.33 kHz channel spacing capability
J5	CPDLC FANS 1/A SATCOM (INMARSAT)	Z	Other equipment carried or other capabilities (<i>see Note 5</i>)
J6	CPDLC FANS 1/A SATCOM (MTSAT)		

Note 1.— If the letter S is used, standard equipment is considered to be VHF RTF, VOR and ILS, unless another combination is prescribed by the appropriate ATS authority.

Note 2.— If the letter G is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator NAV/ separated by a space.

Note 3.— See RTCA/EUROCAE Interoperability Requirements Standard for ATN Baseline 1 (ATN B1 INTEROP Standard – DO-280B/ED-110B) for data link services air traffic control clearance and information/air traffic control communications management/air traffic control microphone check.

Note 4.— If the letter R is used, the performance-based navigation levels that can be met are specified in Item 18 following the indicator PBN/. Guidance material on the application of performance-based navigation to a specific route segment, route or area is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).