

ABKOMMEN ÜBER DIE INTERNATIONALE ZIVILLUFTFAHRT

(CHIKAGOER ABKOMMEN)

Vom 7. Dezember 1944

(BGBl. 1956 II S. 411)

in der für Deutschland geltenden Fassung

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Übersetzung

Inhaltsübersicht ist nicht amtlich.

TEIL I - Allgemeine Grundsätze und Anwendung des Abkommens

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CHIKAGO Artikel 38

Abweichungen von internationalen Richtlinien und Verfahren

Jeder Staat, der es für undurchführbar hält, einer internationalen Richtlinie oder einem solchen internationalen Verfahren in jeder Hinsicht nachzukommen, oder seine eigenen Vorschriften und Maßnahmen mit einer internationalen Richtlinie oder einem internationalen Verfahren nach ihrer Abänderung in volle Übereinstimmung zu bringen, oder der es für nötig hält, Vorschriften oder Verfahren anzunehmen, die irgendwie von denjenigen abweichen, die durch eine internationale Richtlinie festgesetzt sind, wird den Unterschied zwischen seiner eigenen Regelung und derjenigen, die durch die internationale Richtlinie festgelegt ist, sofort der Internationalen Zivilluftfahrt-Organisation anzeigen. Bei Änderungen von internationalen Richtlinien wird jeder Staat, der seine eigenen Vorschriften oder Verfahren nicht entsprechend ändert, dies innerhalb von 60 Tagen nach Annahme der Änderung der internationalen Richtlinie dem Rat anzeigen oder angeben, was er zu veranlassen beabsichtigt. In jedem derartigen Fall wird der Rat sofort allen anderen Staaten den Unterschied anzeigen, der zwischen einem oder mehreren Punkten einer internationalen Richtlinie und der entsprechenden inländischen Regelung in diesem Staat besteht.

International Standards
and Recommended Practices



Annex 14
to the Convention on
International Civil Aviation

Aerodromes

Volume I
Aerodrome Design and Operations

This edition incorporates all amendments adopted by the Council prior to 5 March 2009 and supersedes, on 19 November 2009, all previous editions of Annex 14, Volume I.

For information regarding the applicability of the Standards and Recommended Practices, see Chapter 1, 1.2 and Foreword.

Fifth Edition
July 2009

International Civil Aviation Organization

FOREWORD

Historical background

Standards and Recommended Practices for Aerodromes were first adopted by the Council on 29 May 1951 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 14 to the Convention. The Standards and Recommended Practices were based on recommendations of the Aerodromes, Air Routes and Ground Aids Division at its third session in September 1947 and at its fourth session in November 1949.

Table A shows the origin of subsequent amendments together with a list of the principal subjects involved and the dates on which the Annex and the amendments were adopted by the Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specified request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards and Recommended Practices specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.— *Material comprising the Annex proper:*

- a) *Standards and Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international

air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

- b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.
- c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.
- d) *Tables and Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.— *Material approved by the Council for publication in association with the Standards and Recommended Practices:*

- a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption.
- b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text.
- c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices.
- d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Selection of language

This Annex has been adopted in six languages — English, Arabic, Chinese, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb “shall” is used, and for Recommended Practices the operative verb “should” is used.

3.1.8 Secondary runway

Recommendation.— *The length of a secondary runway should be determined similarly to primary runways except that it needs only to be adequate for those aeroplanes which require to use that secondary runway in addition to the other runway or runways in order to obtain a usability factor of at least 95 per cent.*

3.1.9 Runways with stopways or clearways

Recommendation.— *Where a runway is associated with a stopway or clearway, an actual runway length less than that resulting from application of 3.1.7 or 3.1.8, as appropriate, may be considered satisfactory, but in such a case any combination of runway, stopway and clearway provided should permit compliance with the operational requirements for take-off and landing of the aeroplanes the runway is intended to serve.*

Note.— *Guidance on use of stopways and clearways is given in Attachment A, Section 2.*

Width of runways

3.1.10 Recommendation.— *The width of a runway should be not less than the appropriate dimension specified in the following tabulation:*

Code number	Code letter					
	A	B	C	D	E	F
1 ^a	18 m	18 m	23 m	—	—	—
2 ^a	23 m	23 m	30 m	—	—	—
3	30 m	30 m	30 m	45 m	—	—
4	—	—	45 m	45 m	45 m	60 m

a. *The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.*

Note 1.— *The combinations of code numbers and letters for which widths are specified have been developed for typical aeroplane characteristics.*

Note 2.— *Factors affecting runway width are given in the Aerodrome Design Manual (Doc 9157), Part 1.*

Minimum distance between parallel runways

3.1.11 Recommendation.— *Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:*

- 210 m where the higher code number is 3 or 4;
- 150 m where the higher code number is 2; and
- 120 m where the higher code number is 1.

Note.— *Procedures for wake turbulence categorization of aircraft and wake turbulence separation minima are contained in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM), Doc 4444, Chapter 4, 4.9 and Chapter 5, 5.8, respectively.*

3.1.12 **Recommendation.**— *Where parallel instrument runways are intended for simultaneous use subject to conditions specified in the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168), Volume I, the minimum distance between their centre lines should be:*

- 1 035 m for independent parallel approaches;
- 915 m for dependent parallel approaches;
- 760 m for independent parallel departures;
- 760 m for segregated parallel operations;

except that:

- a) *for segregated parallel operations the specified minimum distance:*
 - 1) *may be decreased by 30 m for each 150 m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and*
 - 2) *should be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft;*
- b) *for independent parallel approaches, combinations of minimum distances and associated conditions other than those specified in the PANS-ATM (Doc 4444) may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.*

Note.— *Procedures and facilities requirements for simultaneous operations on parallel or near-parallel instrument runways are contained in the PANS-ATM (Doc 4444), Chapter 6 and the PANS-OPS (Doc 8168), Volume I, Part III, Section 2, and Volume II, Part I, Section 3; Part II, Section 1; and Part III, Section 3, and relevant guidance is contained in the Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643).*

Slopes on runways

3.1.13 Longitudinal slopes

Recommendation.— *The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:*

- 1 per cent where the code number is 3 or 4; and
- 2 per cent where the code number is 1 or 2.

3.1.14 **Recommendation.**— *Along no portion of a runway should the longitudinal slope exceed:*

- 1.25 per cent where the code number is 4, except that for the first and last quarter of the length of the runway the longitudinal slope should not exceed 0.8 per cent;
- 1.5 per cent where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.8 per cent; and
- 2 per cent where the code number is 1 or 2.

**Doc 4444
ATM/501**



**Procedures for
Air Navigation Services**

Air Traffic Management

This edition incorporates all amendments approved by the Council prior to 2 June 2007 and supersedes, on 22 November 2007, all previous editions of Doc 4444.

Fifteenth Edition — 2007

International Civil Aviation Organization

FOREWORD

1. Historical background

1.1 The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) are the result of the progressive evolution of the *Procedures for Air Navigation Services — Air Traffic Control* (PANS-ATC) prepared by the Air Traffic Control Committee of the International Conference on North Atlantic Route Service Organization (Dublin, March 1946).

1.2 A second version of the PANS-ATC was issued in the same year, following review of the original procedures by the International Conference on European-Mediterranean Route Service Organization (Paris, April–May 1946).

1.3 The Third Edition of the PANS-ATC was prepared in 1947 by the Rules of the Air and Air Traffic Control (RAC) Division at its Second Session (Montreal, December 1946–January 1947).

1.4 Originally applicable on a regional basis, the PANS-ATC became applicable on a worldwide basis on 1 February 1950.

1.5 The Fourth Edition (1951) was given the title *Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services* (PANS-RAC) on the recommendation of the Fourth Session of the Rules of the Air and Air Traffic Control (RAC) Division (Montreal, November–December 1950). This title reflected the fact that certain procedures applicable to pilots and a number of procedures relating to the provision of flight information and alerting service were included therein, in addition to the operation of the air traffic control service.

1.6 Further editions were issued periodically. The origin of each edition issued since 1946 and subsequent amendments thereto are shown in Table A, together with a list of the principal subjects involved, the dates on which the amendments were approved by the Council and the dates on which they became applicable.

1.7 This edition, re-titled *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM), provides for a comprehensive update of the procedures as well as a major reorganization of the contents. The new title reflects that provisions and procedures relating to safety management of air traffic services and to air traffic flow management are included.

2. Scope and purpose

2.1 The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) are complementary to the Standards and Recommended Practices contained in Annex 2 — *Rules of the Air* and in Annex 11 — *Air Traffic Services*. They are supplemented when necessary by regional procedures contained in the *Regional Supplementary Procedures* (Doc 7030).

Note 1.— Although these procedures are mainly directed to air traffic services personnel, flight crews should be familiar with the procedures contained in the following chapters of the document:

Chapters 3, 4 through 9, 12 through 14, Sections 16.3 and 16.4 of Chapter 16, and Appendices 1, 2, 4 and 5.

Note 2.— 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.

2.2 The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) specify, in greater detail than in the Standards and Recommended Practices, the actual procedures to be applied by air traffic services units in providing the various air traffic services to air traffic.

3. Status

3.1 The Procedures for Air Navigation Services (PANS) do not have the same status as the Standards and Recommended Practices. While the latter are *adopted* by Council in pursuance of Article 37 of the Convention on International Civil Aviation, subject to the full procedure of Article 90, the PANS are *approved* by the Council and recommended to Contracting States for worldwide application.

3.2 While the PANS may contain material which may eventually become Standards or Recommended Practices (SARPs) when it has reached the maturity and stability necessary for adoption as such, they may also comprise material prepared as an amplification of the basic principles in the corresponding SARPs, and designed particularly to assist the user in the application of those SARPs.

4. Implementation

The implementation of procedures is the responsibility of Contracting States; they are applied in actual operations only after, and in so far as, States have enforced them. However, with a view to facilitating their processing towards implementation by States, they have been prepared in language which will permit direct use by air traffic services personnel and others associated with the provision of air traffic services to international air navigation.

5. Publication of differences

5.1 The PANS do not carry the status afforded to Standards adopted by the Council as Annexes to the Convention and, therefore, do not come within the obligation imposed by Article 38 of the Convention to notify differences in the event of non-implementation.

5.2 However, attention of States is drawn to the provision of Annex 15 related to the publication in their Aeronautical Information Publications of lists of significant differences between their procedures and the related ICAO procedures.

6. Promulgation of information

Information relating to the establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided according to the Procedures specified in this document should be notified and take effect in accordance with Annex 15.

- e) changes in observed RVR value(s), in accordance with the reported scale in use, or changes in the visibility representative of the direction of approach and landing.

6.7 OPERATIONS ON PARALLEL OR NEAR-PARALLEL RUNWAYS

6.7.1 General

Where parallel or near-parallel runways are used for simultaneous operations, the requirements and procedures below shall apply.

Note.— Guidance material is contained in the Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643).

6.7.2 Departing aircraft

6.7.2.1 TYPES OF OPERATION

Parallel runways may be used for independent instrument departures as follows:

- a) both runways are used exclusively for departures (independent departures);
- b) one runway is used exclusively for departures while the other runway is used for a mixture of arrivals and departures (semi-mixed operation); and
- c) both runways are used for mixed arrivals and departures (mixed operation).

6.7.2.2 REQUIREMENTS AND PROCEDURES FOR INDEPENDENT PARALLEL DEPARTURES

Independent IFR departures may be conducted from parallel runways provided:

- a) the runway centre lines are spaced by the distance specified in Annex 14, Volume I;
- b) the departure tracks diverge by at least 15 degrees immediately after take-off;
- c) suitable surveillance radar capable of identification of the aircraft within 2 km (1.0 NM) from the end of the runway is available; and
- d) ATS operational procedures ensure that the required track divergence is achieved.

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:

**Doc 9643
AN/941**



Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR)

**Approved by the Secretary General
and published under his authority**

First Edition — 2004

International Civil Aviation Organization

FOREWORD

At the request of the Air Navigation Commission (ANC), the ICAO Secretariat prepared a report on simultaneous operations on parallel or near-parallel instrument runways, which included proposals regarding minimum distances between instrument runways. In 1980, the ANC reviewed the report, recognizing the difficulty in determining acceptable distances between parallel instrument runways and agreeing on the need for ICAO to study the matter further. States and selected international organizations were invited to provide information on current practices and related questions with respect to minimum distances between parallel runways for simultaneous use under instrument flight rules (IFR).

Four States indicated that they had operational experience with simultaneous operations on parallel instrument runways and had conducted studies on the subject. The requirements for the simultaneous use of such runways were considerable, and there was support for ICAO to develop specifications and undertake work on this subject.

The Commission, in light of the views expressed by selected States and international organizations on minimum distances between instrument runways used for simultaneous operations, noted the complex nature of the subject and the fact that it covered many disciplines in the air navigation field. It also agreed that guidance material was needed in view of the complexity of the subject. In January 1981, the Commission decided to proceed with the study and authorized the establishment of an air navigation study group, designated the Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) Study Group, to assist the Secretariat in its work.

Subsequently, at the request of the ANC, this manual on simultaneous operations on parallel or near-parallel

instrument runways was prepared by the ICAO Secretariat, with the assistance of the study group.

The information contained in this manual reflects the experience accumulated by several States and is intended to facilitate implementation of related provisions in Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations*, Chapters 1 and 3; the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), Chapter 6; and the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume I, Part I, Chapter 1, and Volume II, Part II, Chapter 6.

Following the updating of the ICAO provisions related to SOIR, applicable on 9 November 1995, the SOIR Study Group continued to assist in evaluating the use of new technologies, such as the global navigation satellite system (GNSS), for the purpose of supporting simultaneous IFR operations on closely spaced parallel runways, with a view to updating the relevant provisions and guidance material as necessary.

This manual is intended to be a living document. Periodic amendments or new editions will be published on the basis of experience gained and of comments and suggestions received from users of this manual. Readers are therefore invited to address their comments, views and suggestions to:

The Secretary General
999 University Street
Montréal, Quebec H3C 5H7
Canada

Chapter 3

INDEPENDENT INSTRUMENT DEPARTURES FROM PARALLEL RUNWAYS (MODE 3)

3.1 GENERAL

Parallel runways may be used for independent instrument departures as follows:

- a) both runways are used exclusively for departures (independent departures);
- b) one runway is used exclusively for departures, while the other runway is used for a mixture of arrivals and departures (semi-mixed operation); and
- c) both runways are used for mixed arrivals and departures (mixed operation).

3.2 REQUIREMENTS AND PROCEDURES

Independent IFR departures may be conducted from parallel runways provided:

- a) the runway centre lines are spaced by the distance specified in Annex 14, Volume I;
- b) the departure tracks diverge by at least 15 degrees immediately after take-off;

- c) suitable surveillance radar capable of identifying the aircraft within 2 km (1.0 NM) from the end of the runway is available; and
- d) ATS operational procedures ensure that the required track divergence is achieved.

3.3 RUNWAY SPACINGS

3.3.1 There is no requirement, other than satisfactory two-way radiocommunications, for any other specialized form of control or navigation aid facility for the conduct of independent instrument departures when the spacing between parallel runways is 1 525 m (5 000 ft) or more and a course divergence after take-off of 45 degrees or more can be achieved (see Figure 3-1).

3.3.2 Simultaneous take-off of aircraft departing in the same direction from parallel runways is authorized where the runway centre lines are spaced by at least 760 m (2 500 ft), suitable surveillance radar is available, and courses diverge by 15 degrees or more immediately after departure (see Figure 3-2).

Note.— Procedures for independent instrument departures from parallel runways are contained in the PANS-ATM, Chapter 6, 6.7.

ICAO

CIRCULAR

CIRCULAR 207-AN/126



SIMULTANEOUS OPERATIONS ON PARALLEL OR NEAR-PARALLEL INSTRUMENT RUNWAYS (SOIR)

*Approved by the Secretary General
and published under his authority*

INTERNATIONAL
CIVIL AVIATION
ORGANIZATION
MONTREAL • CANADA

Foreword

1. GENERAL

1.1 This circular on simultaneous operations on parallel or near-parallel instrument runways has been prepared by the ICAO Secretariat at the request of the Air Navigation Commission, and with the assistance of a study group made up of members nominated by several Contracting States and international organizations.

1.2 The experts participating in the study group were nominated by Canada, France, United Kingdom, United States, the Airport Associations Coordinating Council (AACC), the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFALPA), and were suitably qualified and experienced in the planning and conduct of all aspects of simultaneous operations on parallel or near-parallel instrument runways.

1.3 The information contained in this circular is a compendium of the experience accumulated by several States, experience that is considered sufficient in nature and scope to be included in an ICAO circular.

2. BACKGROUND INFORMATION

2.1 On 13 March 1980 the Air Navigation Commission reviewed the Secretariat's report and proposals regarding the possibility of developing a Standard or Recommended Practice for minimum distances between instrument runways. When considering this issue, the Commission recognized the difficulty of working out an agreement on the parameters which would have to be taken into account in determining acceptable distances between parallel instrument runways and agreed on the need for ICAO to study the matter further. The Commission decided that States and interested international organizations should be invited to provide information on current practices and related questions with respect to minimum distances between parallel runways for simultaneous use under instrument meteorological conditions.

2.2 The Secretariat, in response to this decision of the Commission, queried ten Contracting States and four international organizations, seeking views on several issues related to minimum distances between parallel runways for simultaneous use under instrument meteorological conditions. The States selected were those considered to have experience in developing criteria for procedures relating to the separation of aircraft conducting instrument approaches to parallel runways.

2.3 The information received indicated that four States have operational experience with simultaneous operations on parallel instrument runways and that these States have conducted studies on the subject. The requirements for the simultaneous use of such runways are considerable, and a number of States and organizations indicated firm views on what these requirements should be. There was also support for ICAO to develop specifications and undertake work on this subject.

2.4 When the Commission completed its review of the Secretariat's report on the views of selected States and international organizations on minimum distances between instrument runways used for simultaneous operations, it noted the complex nature of the subject and the fact that it covered virtually all the disciplines in the air navigation field. It also agreed that guidance material was needed to make clear to States the complexity of the subject. The Commission decided on 29 January 1981 to proceed with the study and established the Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) Study Group.

2.5 The study group held its first meeting in Montreal from 27 February to 2 March 1984. At the meeting, the study group discussed in detail the various modes of operation which could be used on parallel or near-parallel instrument runways, and agreed on classifications for four modes of operation. It also examined meteorological conditions in which visual operations could be conducted, and attempted to determine if specific aerodrome operating minima were linked to the use of simultaneous operations. The group noted that there were no minima

Chapter 4

Independent Instrument Departures from Parallel Runways (Mode 3)

4.1 GENERAL CONCEPT

4.1.1 Parallel runways may be used for independent instrument departures at any time as a result of operating those runways in one of the following ways:

- a) one runway is used exclusively for departures while the other runway is used for a mixture of arrivals and departures (semi-mixed operation);
- b) both runways are used for mixed arrivals and departures (mixed operation); and
- c) both runways are used exclusively for departures.

4.1.2 The three main parameters which govern whether independent instrument departures can be conducted at a specific location are:

- a) the spacing between runway centre lines;
- b) the course divergence after take-off; and
- c) the availability of radar.

4.1.3 Independent instrument departures from parallel runways are practised in at least two States, i.e. the United States and Canada. Both States have similar requirements for the degree of course divergence between departure tracks where radar is available.

4.2 GROUND EQUIPMENT

4.2.1 There is no requirement, other than satisfactory two-way radiocommunications, for any other specialized form of control or navigation aid facility for the conduct of independent instrument departures, except where spacing between parallel runways is less than 1 525 m (5 000 ft) and a course divergence after take-off of 45° or more cannot be achieved. Under these circumstances radar should be provided.

4.2.2 Where radar is a requirement, its technical specifications should be of an order which would enable identification of aircraft within 2 km (1.0 NM) of the departure end of the runways in use. Primary radar data must be available.

4.3 WEATHER MINIMA

The concepts described under 4.1 are applicable in all weather conditions.

4.4 RUNWAY SPACINGS AND ATC PROCEDURES

United States

4.4.1 Simultaneous take-off of aircraft departing in the same direction from parallel runways is authorized where the runway centre lines are spaced by at least 760 m (2 500 ft) and courses diverge by 15° or more immediately after departure (see Figure 4-1).

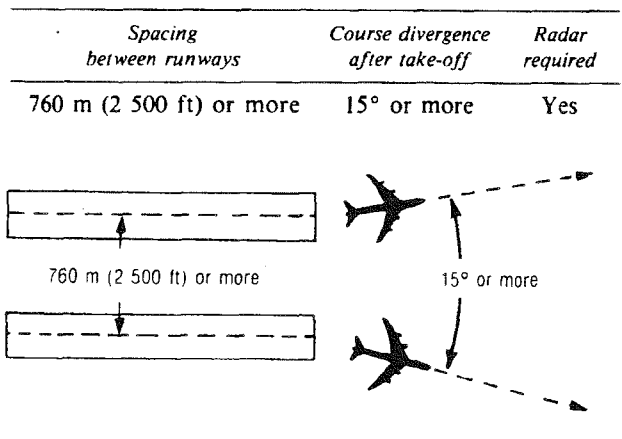


Figure 4-1

Canada

4.4.2 Simultaneous take-off of aircraft departing in the same direction from parallel runways is authorized where the runway centre lines are spaced by at least 1 525 m (5 000 ft) and the course of one aircraft diverges from the other by 15° or more immediately after departure (see Figure 4-2). Turns after take-off must be initiated not later than 150 m (500 ft) above ground level (AGL).

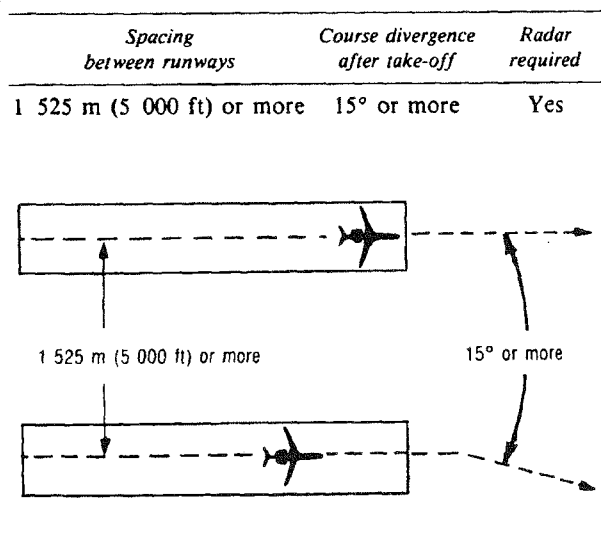


Figure 4-2

4.4.3 Simultaneous take-off of aircraft departing in the same direction from parallel runways is authorized where the runway centre lines are spaced by at least 1 525 m (5 000 ft) and the course of one aircraft diverges from the other by 45° immediately after take-off (see Figure 4-3). Turns after take-off must be initiated not later than 150 m (500 ft) AGL.

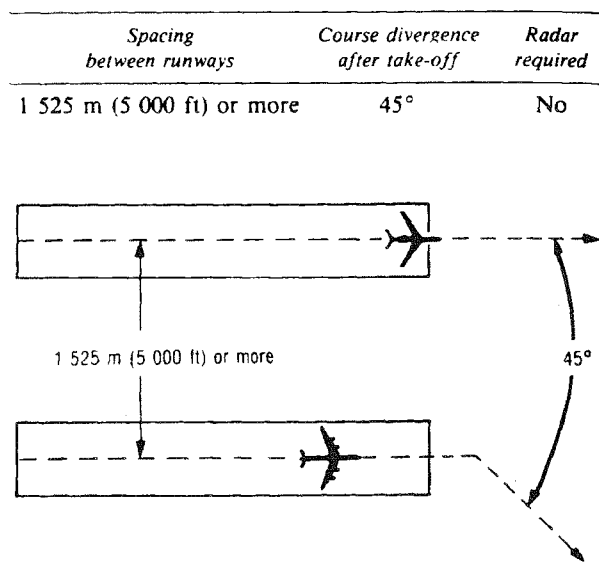


Figure 4-3

**Doc 8168
OPS/611**



**Procedures for
Air Navigation Services**

Aircraft Operations

**Volume II
Construction of Visual and
Instrument Flight Procedures**

This edition incorporates all amendments approved by the Council prior to 3 October 2006 and supersedes, on 23 November 2006, all previous editions of Doc 8168, Volume II.

Fifth edition – 2006

International Civil Aviation Organization

FOREWORD

1. INTRODUCTION

1.1 The *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS) consists of two volumes as follows:

Volume I — *Flight Procedures*

Volume II — *Construction of Visual and Instrument Flight Procedures*

The division of the PANS-OPS into the two volumes was accomplished in 1979 as a result of an extensive amendment to the obstacle clearance criteria and the construction of approach-to-land procedures (Amendments 13 and 14). Prior to 1979, all PANS-OPS material was contained in a single document. Table A shows the origin of amendments together with a list of the principal subjects involved and the dates on which the PANS-OPS and the amendments were approved by the Council and when they became applicable.

1.2 Volume I — *Flight Procedures* describes operational procedures recommended for the guidance of flight crew and flight operations personnel. It also outlines the various parameters on which the criteria in Volume II are based so as to illustrate the need to adhere strictly to the published procedures in order to achieve and maintain an acceptable level of safety in operations.

1.3 Volume II — *Construction of Visual and Instrument Flight Procedures* is intended for the guidance of procedures specialists and describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations. It provides the basic guidelines to States, and those operators and organizations producing instrument flight charts that will result in uniform practices at all aerodromes where instrument flight procedures are carried out.

1.4 Both volumes present coverage of operational practices that are beyond the scope of Standards and Recommended Practices but with respect to which a measure of international uniformity is desirable.

1.5 The design of procedures in accordance with PANS-OPS criteria assumes normal operations. It is the responsibility of the operator to provide contingency procedures for abnormal and emergency operations.

2. COMMENTARY ON THE MATERIAL CONTAINED IN VOLUME II

2.1 Part I — General

2.1.1 This part contains the general criteria that apply to both conventional as well as RNAV and satellite-based procedures.

2.1.2 Section 1 describes the terminology to assist in the interpretation of terms which are used in the procedures and have a particular technical meaning. In some cases, the terms are defined in other ICAO documents. A list of abbreviations is also provided.

2.3.3 In 2004, GLS Cat I (ILS look alike) criteria based on GBAS receivers were introduced in PANS-OPS. GLS Cat II/III criteria can be expected after the Annex 10 SARPs have been finalized.

2.3.4 The T/Y bar concept was introduced for Basic GNSS in 1998 and made applicable for RNAV approach procedures in general in 2004. To facilitate pilots flying a T/Y bar approach, the Terminal Arrival Altitude (TAA) concept was also included.

Holding procedures

2.3.5 Area navigation (RNAV) criteria for holding procedures were included in 1993 arising from the ninth meeting of the Obstacle Clearance Panel. RNP holding procedures were added in 1998. In the 5th edition of PANS-OPS, as a result of the rewrite of PANS-OPS, the VOR/DME criteria were generalized to include DME/DME and basic GNSS as well.

2.4 PART IV — Helicopters

Part IV contains the criteria applicable for Helicopter Point-in-space procedures based on a Basic GNSS receiver which were introduced in 2004.

3. STATUS

Procedures for Air Navigation Services (PANS) do not have the same status as Standards and Recommended Practices. While the latter are *adopted* by Council in pursuance of Article 37 of the Convention and are subject to the full procedure of Article 90, PANS are *approved* by Council and are recommended to Contracting States for worldwide application.

4. IMPLEMENTATION

The implementation of procedures is the responsibility of Contracting States; they are applied in actual operations only after, and in so far as States have enforced them. However, with a view to facilitating their processing towards implementation by States, they have been prepared in a language which will permit direct use by operations personnel. While uniform application of the basic procedures in this document is very desirable, latitude is permitted for the development of detailed procedures which may be needed to satisfy local conditions.

5. PUBLICATION OF DIFFERENCES

5.1 The PANS do not carry the status afforded to Standards adopted by the Council as Annexes to the Convention and, therefore, do not come within the obligation imposed by Article 38 of the Convention to notify differences in the event of non-implementation.

5.2 However, attention of States is drawn to the provisions of Annex 15 related to the publication in their aeronautical information publications of lists of significant differences between their procedures and the related ICAO procedures.

Chapter 3

DEPARTURE ROUTES

3.1 GENERAL

3.1.1 There are two basic types of departure route: straight and turning.

3.1.2 Track guidance shall be provided:

- a) within 20.0 km (10.8 NM) from the departure end of the runway (DER) for straight departures; and
- b) within 10.0 km (5.4 NM) after completion of turns for turning departures.

3.1.3 Surveillance radar may be used to provide track guidance.

3.2 STRAIGHT DEPARTURES

3.2.1 General

3.2.1.1 A departure in which the initial departure track is within 15° of the alignment of the runway centre line is a straight departure. Wherever practical, the departure track should be the extended runway centre line (see Figure I-3-3-1).

3.2.1.2 For helicopters, the departure track must intersect the runway centre line within 1.7 km (0.9 NM) from the DER, or the departure track must be within 90 m laterally from the runway centre line at the DER.

3.2.2 Types of straight departure

Straight departures are divided into two main categories, depending upon the availability of initial track guidance:

- a) straight departure without track guidance:
 - 1) departure with no track adjustment;
 - 2) departure with track adjustment (track adjustment point not specified); and
 - 3) departure with track adjustment (track adjustment point specified); and

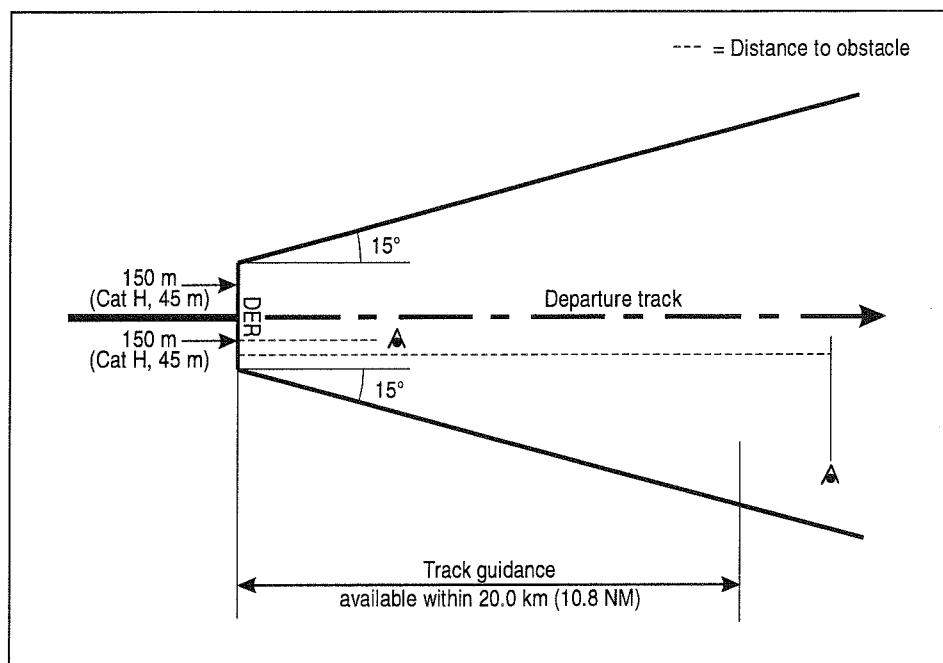


Figure I-3-3-1. Straight departure area without track guidance

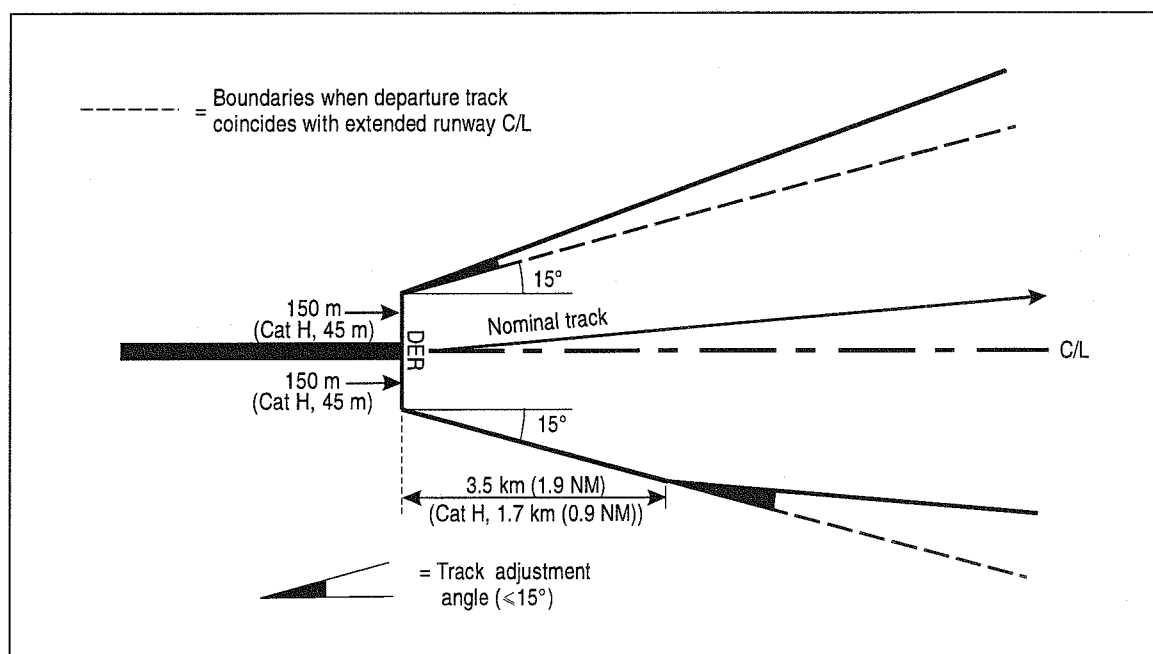
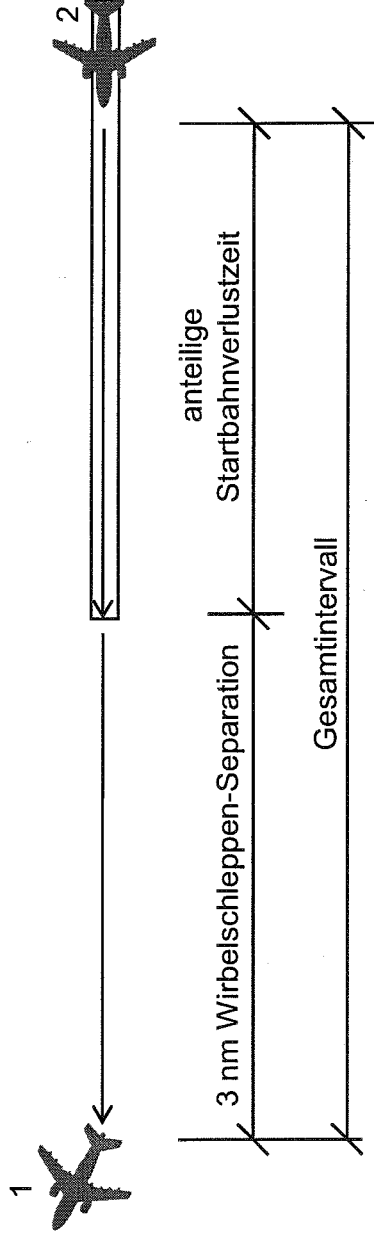


Figure I-3-3-2. Straight departure area with track adjustment (track adjustment point not specified)



Vereinfachte Separationsregeln – Single Bahnbetrieb

Prinzipdarstellung zur Separation zwischen zwei Starts.



Die Gesamtintervallzeit setzt sich zusammen aus der anteiligen Startbahnverlustzeit (SVZ) + 3 nm.

- 100% der Flugzeuge der Klasse Medium sind bei ca. 1800-2000 m abgerollt.
- Die anteilige SVZ ergibt sich aus dem Unterschied der Geschwindigkeiten zwischen dem gestarteten, bereits beschleunigten Flugzeug und dem nachfolgenden, erst beschleunigenden Flugzeug bezogen auf den Zeitverlust, welcher durch die Länge der Startrollstrecke entsteht.
- Die Gesamtintervallzeit von zwei aufeinander folgenden Starts ergibt somit **im besten Fall** einen minimalen Abstand von ca. 90 s (theoretische Grenzkapazität der vereinfachten Kapazitätsschätzung).
- Dies entspricht in etwa $3.600 \text{ s} / 90 \text{ s} = 40$ Bewegungen (max. **Bahnkapazität Single-Betrieb Starts**).
- **Durch ungleiche Startgeschwindigkeiten oder ungleiche Flugzeuggrößen reduziert sich dieser Wert, da die Separation angehoben werden muss. Ein Ausweg wären unterschiedliche Abflugrouten.** Angenommen werden deshalb für erste Abschätzungen i.d.R. ca. 35 Bew. bei Single-Betrieb.

