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Tel.: +1 (514) 954-6711

Ref.: AN 13/2.5-09/45

19 June 2009

Subject: Proposal for the amendment of the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) relating to the application of PBN and GNSS

Action Required: Comments to reach Montreal by 30 September 2009

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, at the eighth and tenth meetings of its 180th Session on 3 and 10 March 2009, considered a proposal to amend aircraft separation minima contained in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), and authorized its transmission to Contracting States and appropriate international organizations for comment.

2. The proposed amendments, as modified by the discussions of the Commission, are contained in Attachment A to this letter.

3. The purpose of the proposed amendment is to provide air traffic controllers with additional tools to enhance efficiency as well as safety, through a broader use of global navigation satellite system (GNSS)-based separation, performance-based navigation (PBN) procedures, and improved lateral separation minima on diverging and converging tracks. The proposal would:

- a) extend existing 5 and 10 minute in-trail climb separation minima to GNSS-equipped aircraft;
- b) place the lateral separation minima for PBN operations for RNP 10 and RNP 4 aircraft in the PANS-ATM; and
- c) provide new and updated procedures for divergent track separation.

4. During its preliminary review of the proposal, the Commission discussed the amendment related to divergent track separation and in that context, reviewed the possibility of deleting paragraph 5.4.1.2.1.2.1 due to the ambiguity created by the use of the term “considerably more”. The need to move Table 5-1 to reflect its application to other related provisions was also discussed. In conclusion, the

Commission agreed that the Table was suitably placed, however paragraph 5.4.1.2.1.2.1 should be moved closer to subparagraphs 5.4.1.2.1.2 a) and b) to which it more aptly applies.

5. It is deemed that implementation of this proposal for amendment will require a minimum amount of resources. However, in order to provide a solid basis for further impact assessment by the Commission, I would be grateful if you could provide me with an estimate of the financial and other resources required by air navigation services providers and aircraft operators in your State for implementation of the proposals.

6. In examining the proposed amendments, you should not feel obliged to comment on editorial aspects as such matters will be addressed by the Air Navigation Commission during its final review of the draft amendment.

7. May I request that any comments you may wish to make on the proposed amendments be dispatched to reach me not later than 30 September 2009. The Air Navigation Commission has asked me to specifically indicate that comments received after the due date may not be considered by the Commission and the Council. In this connection, should you anticipate a delay in the receipt of your reply please let me know in advance of the due date.

8. For your information, as implementation of this proposed amendment to the PANS-ATM is expected to require substantial time for preparation, it is envisaged for applicability on 18 November 2010. Any comments you may have thereon would be highly appreciated.

9. The subsequent work of the Air Navigation Commission and the Council would be greatly facilitated by specific statements on the acceptability or otherwise of the proposal. Please note that, for the review of your comments by the Air Navigation Commission and the Council, replies are normally classified as “agreement with or without comments”, “disagreement with or without comments” or “no indication of position”. If in your reply the expression “no objections” or “no comments” are used, they will be taken to mean “agreement without comment” and “no indication of position”, respectively. In order to facilitate proper classification of your response, a form has been included in Attachment B which may be completed and returned together with your comments, if any, on the proposals in Attachment A.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Enclosures:

- A — Proposed amendment to the PANS-ATM
- B — Response form

ATTACHMENT A to State letter AN 13/2.5-09/45

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it~~ text to be deleted
2. **New text to be inserted is highlighted with grey shading** new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading. new text to replace existing text

**PROPOSED AMENDMENT TO THE
PROCEDURES FOR
AIR NAVIGATION SERVICES
AIR TRAFFIC MANAGEMENT
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION**

Chapter 1

DEFINITIONS

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Common point. A point on the surface of the earth common to the ~~paths~~ tracks of two aircraft, used as a basis for ~~describing longitudinal separation minima~~ the application of separation (e.g. significant point, waypoint, navigation aid, fix).

Note.—Common point is not used for operational purposes or in pilot-controller communications.

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Chapter 5

SEPARATION METHODS AND MINIMA

**5.2 PROVISIONS FOR THE SEPARATION OF
CONTROLLED TRAFFIC**

5.2.1 General

5.4 HORIZONTAL SEPARATION

5.4.1.2 LATERAL SEPARATION CRITERIA AND MINIMA

...

5.4.1.2.1 Means by which lateral separation may be applied include the following:

5.4.1.2.1.1 *By reference to the same or different geographic locations.* By position reports which positively indicate the aircraft are over different geographic locations as determined visually or by reference to a navigation aid (see Figure 5-1).

5.4.1.2.1.2 *By use of ~~the same navigation aid or method~~ NDB, VOR and GNSS.* By requiring aircraft to fly on specified tracks which are separated by a minimum amount appropriate to the navigation aid ~~or method employed~~. Lateral separation between two aircraft exists when:

- a) *VOR:* both aircraft are established on radials diverging by at least 15 degrees and at least one aircraft is at a distance of 28 km (15 NM) or more from the facility (see Figure 5-2);

- b) *NDB*: both aircraft are established on tracks to or from the NDB which are diverging by at least 30 degrees and at least one aircraft is at a distance of 28 km (15 NM) or more from the facility (see Figure 5-3);
- c) ~~*dead reckoning (DRG)*~~ *GNSS/GNSS*: ~~both each aircraft are is established on tracks diverging by at least 45 degrees and at least one aircraft is at a distance of 28 km (15 NM) or more from the point of intersection of the tracks, this point being determined either visually or by reference to a navigation aid and both aircraft are established outbound from the intersection (see Figure 5-4) the centre line of a track between two waypoints or on the centre line of a track to or from a waypoint and at least one aircraft is at a minimum distance from a common point as specified in Table 5-1; or~~
- d) ~~*RNAV operations*~~ *VOR/GNSS*: ~~both the aircraft are using VOR is established on tracks which diverge by at least 15 degrees and the protected airspace associated with the track of one aircraft does not overlap with the protected airspace associated with the track of the other aircraft. This is determined by applying the angular difference between two tracks and the appropriate protected airspace value. The derived value is expressed as a distance from the intersection of the two tracks at which lateral separation exists a radial to or from the VOR and the aircraft using GNSS is established on the centre line of a track between two waypoints or on the centre line of a track to or from a waypoint and at least one aircraft is at a minimum distance from a common point as specified in Table 5-1.~~

5.4.1.2.1.2.1 When aircraft are operating on tracks which are separated by considerably more than the foregoing minimum figures, States may reduce the distance at which lateral separation is achieved.

Table 5-1

Angular difference between tracks	Aircraft 1: VOR or GNSS Aircraft 2: GNSS	
	FL000 – FL280 Distance from a common point	FL290 – FL600 Distance from a common point
14	60 NM	61 NM
15	15 NM	22 NM
16-30	11 NM	20 NM
31-45	10 NM	13 NM
46-135	8 NM	11 NM
1. The distances in the table are ground distances. States must take into account slant range when DME is being utilized to provide range information. 2. States should consider adding an additional buffer when one or both aircraft are inbound to the common point to take account of the effect of increased closure rate on risk.		

Note 1.— Unless otherwise instructed, aircraft may initiate a turn up to 25 NM prior to the significant point depending on a number of factors including wind, altitude, speed and the magnitude of the turn.

Note 2.— The values in the table above are from a larger table of values derived by collision risk analysis. The source table for separation of aircraft navigating by means of GNSS and VOR is contained

in Circular 322, Guidelines for the implementation of GNSS lateral separation minima. States may refer to that table for greater detail and other angular differences and separation distances.

5.4.1.2.1.2.2 Before applying GNSS-based track separation the controller shall ensure that the aircraft is navigating using GNSS.

5.4.1.2.1.2.3 In order to minimize the possibility of operational errors, predefined waypoints shall be used whenever possible in lieu of manually entered waypoints, when applying GNSS-based track separation. In the event that it is operationally restrictive to use predefined waypoints, the use of waypoints that require manual entry by flight crews should be limited to either half or one degree increments of both latitude and longitude.

5.4.1.2.1.2.4 GNSS-based track separation shall not be applied on diverging tracks originating from fly-over waypoints.

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

Note 1.— 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.

Note 2.— Some aircraft may not have the capability of flying an outbound track, radial or bearing which does not have a termination waypoint.

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 *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.

5.4.1.2.1.5 *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 the following:

- a) for a minimum spacing between tracks of 93 km (50 NM) a navigational performance of RNAV 10 (RNP 10) or RNP 4 shall be prescribed; and
- b) for a minimum spacing between tracks of 55.5 km (30 NM) a navigational performance of RNP 4 shall be prescribed.

Note 1.— Guidance material for the implementation of the navigation capability supporting 93 km (50 NM) and 55.5 km (30 NM) lateral separation is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

Note 2.— Guidance material for implementation of communication capability supporting 93 km (50 NM) and 55.5 km (30 NM) lateral separation is contained in the Manual on Required Communication Performance (RCP) (Doc 9869). Information regarding RCP allocations for these capabilities is contained in RTCA DO-306/EUROCAE ED-122 Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard).

Note 3.— Existing implementations of 30 NM lateral separation minimum require a communication capability of direct controller-pilot voice communications or CPDLC and a surveillance capability by an ADS-C system in which a periodic contract and waypoint change and lateral deviation event contracts are applied.

5.4.1.2.1.56 RNAV operations (where RNP is specified) on intersecting tracks or ATS routes. The use of this separation is limited to intersecting tracks that converge to or diverge from a common point at angles between 15 and 135 degrees.

5.4.1.2.1.56.1 For intersecting tracks, the entry points to and the exit points from the area in which lateral distance between the tracks is less than the required minimum are termed lateral separation points. The area bound by the lateral separation points is termed the area of conflict (see Figure 5-5).

5.4.1.2.1.56.2 The distance of the lateral separation points from the track intersection shall be determined by collision risk analysis and will depend on complex factors such as the navigation accuracy of the aircraft, traffic density, and occupancy.

Note.— Information on the establishment of lateral separation points and collision risk analyses are contained in the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

5.4.1.2.1.56.3 Lateral separation exists between two aircraft when at least one of the aircraft is outside the area of conflict.

Replace Figure 5-2 with the following.

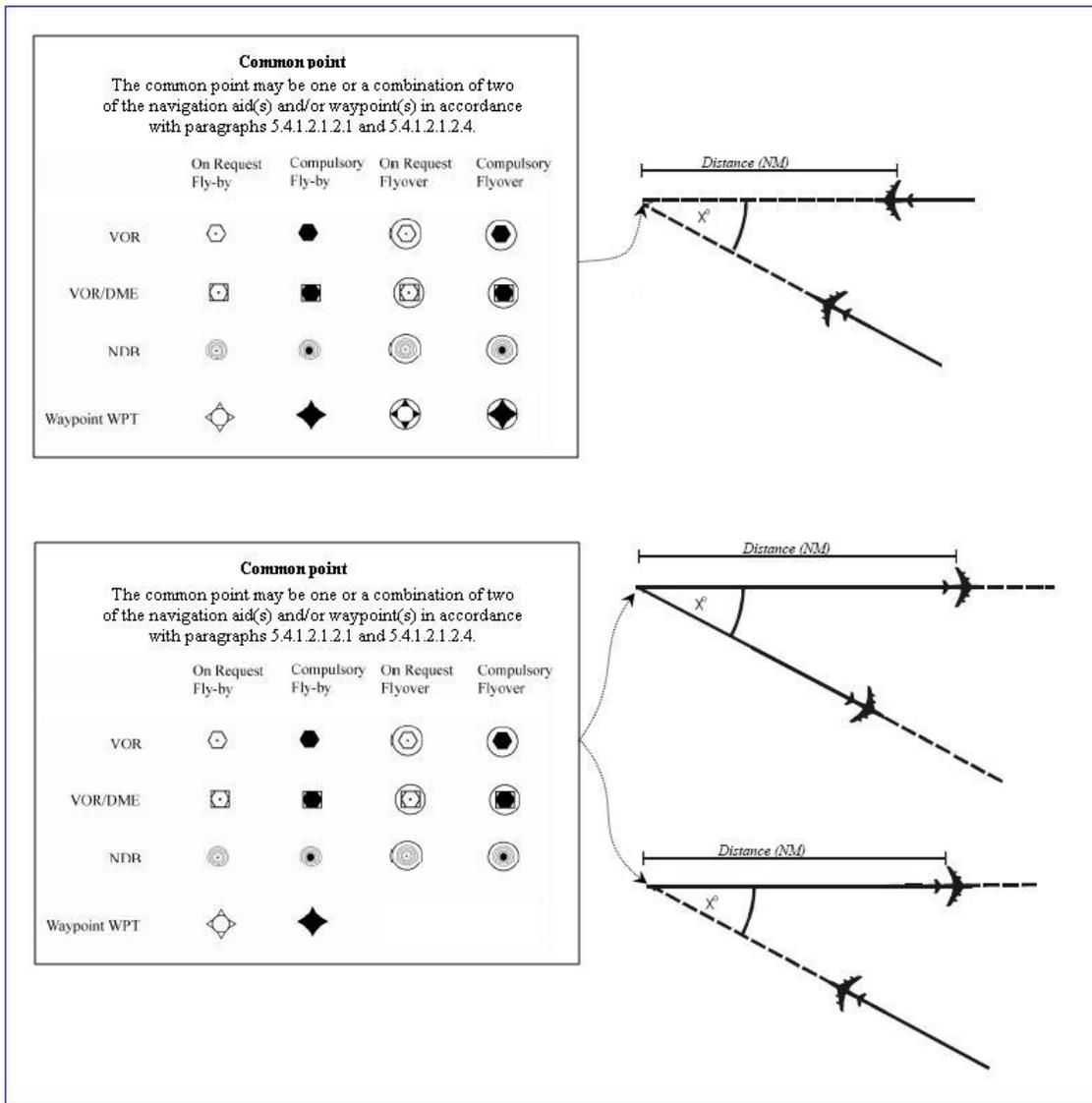


Figure 5-2. Separation using the same GNSS, VOR or NDB

Delete Figures 5-3 and 5-4; renumber subsequent figures.

5.4.2 Longitudinal separation

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5.4.2.2 LONGITUDINAL SEPARATION MINIMA BASED ON TIME

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5.4.2.2.2 AIRCRAFT CLIMBING OR DESCENDING

5.4.2.2.2.1 *Aircraft on the same track.* When an aircraft will pass through the level of another aircraft on the same track, the following minimum longitudinal separation shall be provided:

- a) 15 minutes while vertical separation does not exist (see Figures 5-15A and 5-15B); or
- b) 10 minutes while vertical separation does not exist, provided that such separation is authorized only where ground-based navigation aids or GNSS permit frequent determination of position and speed (see Figures 5-16A and 5-16B); or
- c) 5 minutes while vertical separation does not exist, provided that:
 - 1) the level change is commenced within 10 minutes of the time the second aircraft has reported over ~~an exact reporting point~~ a common point which must be derived from ground-based navigation aids or by GNSS; and
 - 2) when issuing the clearance through third party communication or CPDLC a restriction shall be added to the clearance to ensure that the 10 minute condition is satisfied (see Figures 5-17A and 5-17B).

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.

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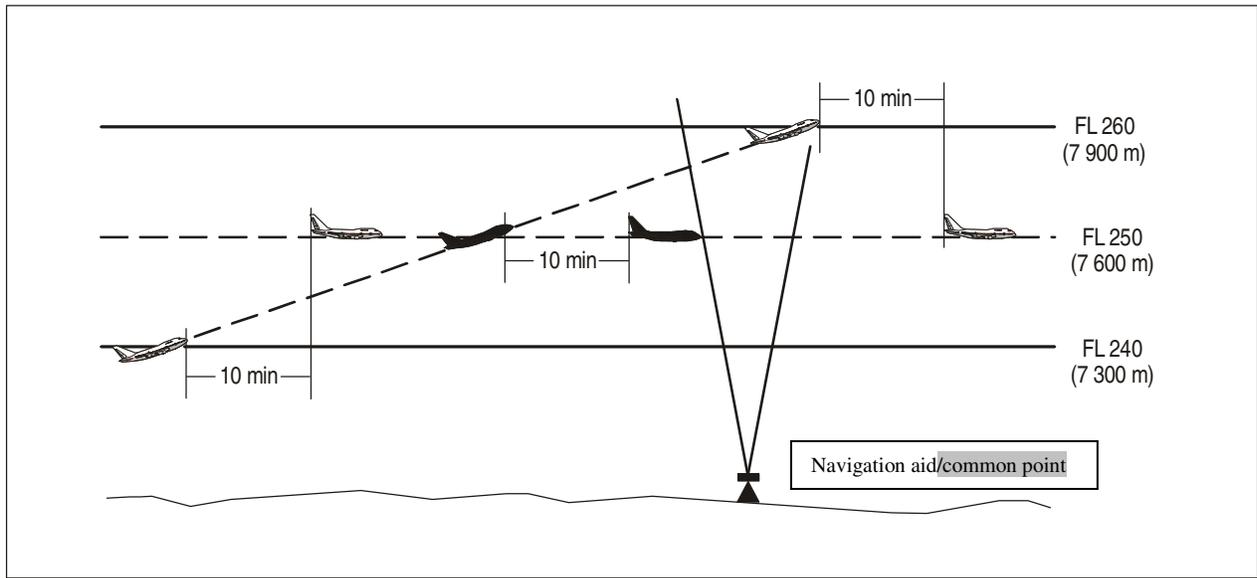


Figure 5-16A. Ten-minute separation between aircraft climbing and on same track (see 5.4.2.2.1 b)

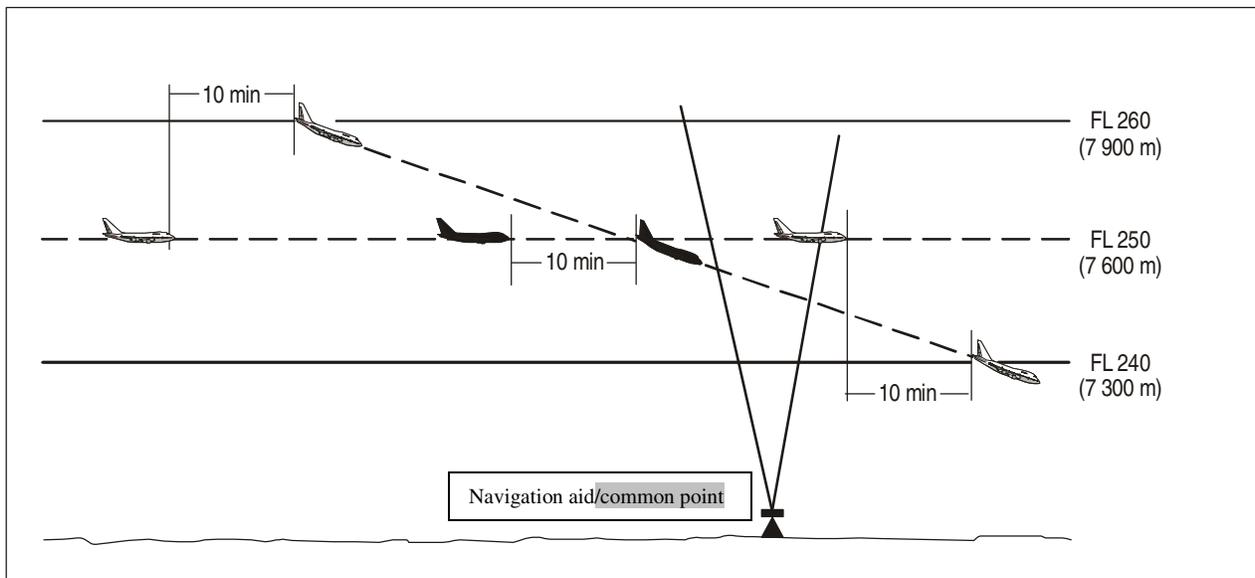


Figure 5-16B. Ten-minute separation between aircraft descending and on same track (see 5.4.2.2.1 b)

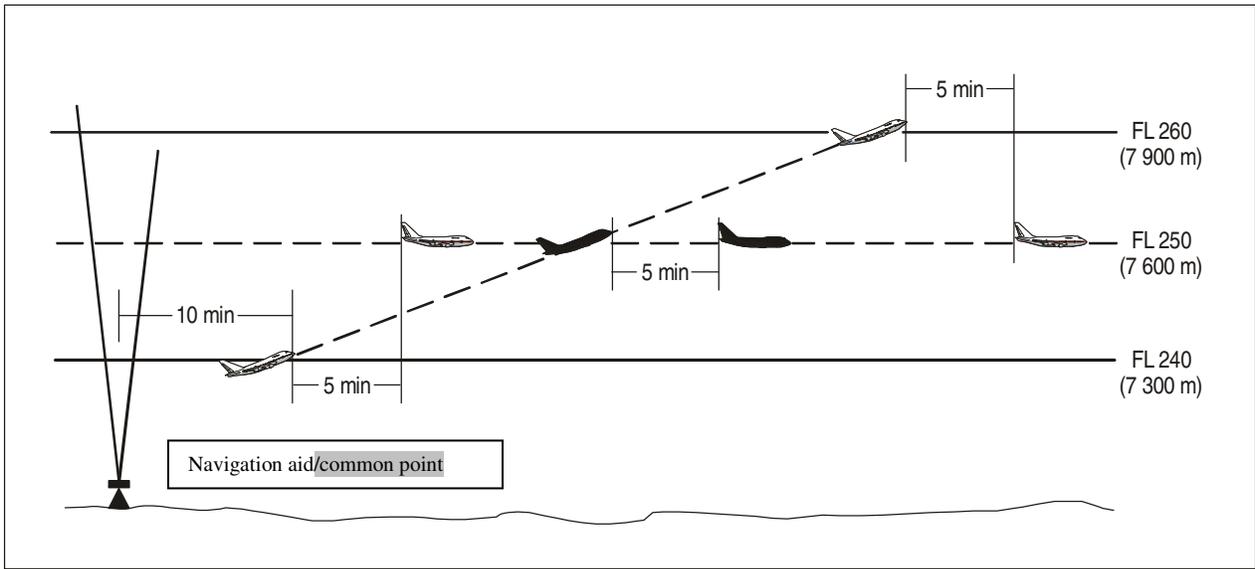


Figure 5-17A. Five-minute separation between aircraft climbing and on same track (see 5.4.2.2.1 c)

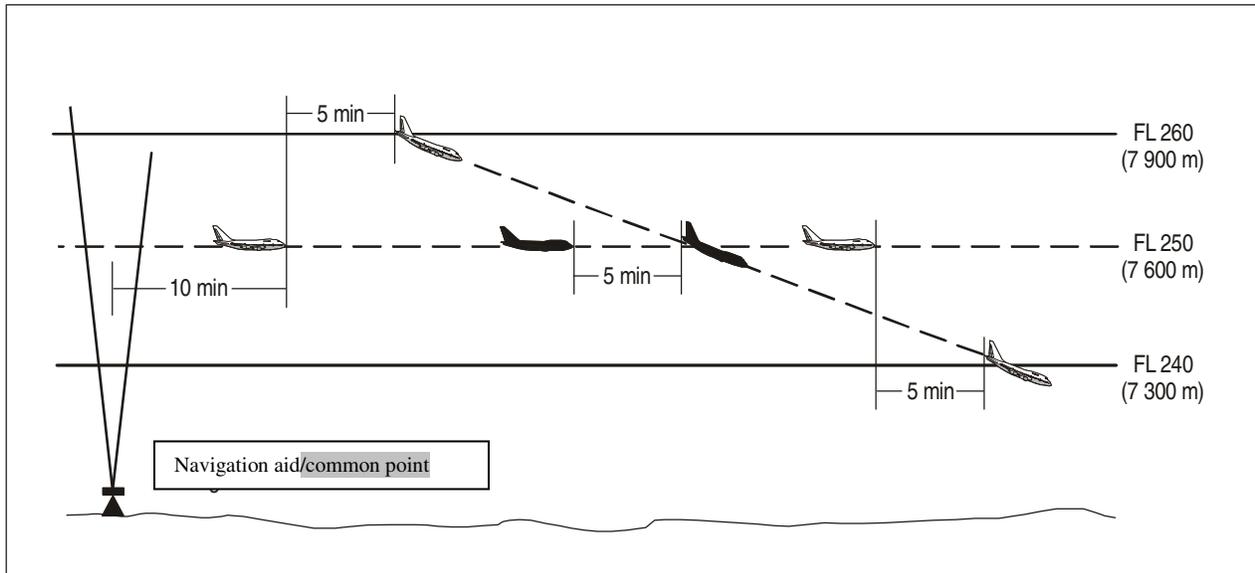


Figure 5-17B. Five-minute separation between aircraft descending and on same track (see 5.4.2.2.1 c)

Chapter 12

PHRASEOLOGIES

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12.3 ATC PHRASEOLOGIES

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12.3.1.13 GNSS SERVICE STATUS

- a) GNSS REPORTED UNRELIABLE (*or* GNSS MAY NOT BE AVAILABLE [DUE TO INTERFERENCE]);
 - 1) IN THE VICINITY OF (*location*) (*radius*) [BETWEEN (*levels*)];
 - or
 - 2) IN THE AREA OF (*description*) (*or* IN (*name*) FIR) [BETWEEN (*levels*)];
 - b) BASIC GNSS (*or* SBAS, *or* GBAS) UNAVAILABLE FOR (*specify operation*) [FROM (*time*) TO (*time*) (*or* UNTIL FURTHER NOTICE)];
 - *c) BASIC GNSS UNAVAILABLE [DUE TO (*reason, e.g. LOSS OF RAIM or RAIM ALERT*)];
 - *d) GBAS (*or* SBAS) UNAVAILABLE.
 - e) CONFIRM NAVIGATION GNSS
- * Denotes pilot transmission.

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12.3.2 Area control services

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12.3.2.8 SEPARATION INSTRUCTIONS

- a) CROSS (*significant point*) AT (*time*) [OR LATER (*or* OR BEFORE)];
- b) ADVISE IF ABLE TO CROSS (*significant point*) AT (*time or level*);
- c) MAINTAIN MACH (*number*) [OR GREATER (*or* OR LESS)] [UNTIL (*significant point*)];
- d) DO NOT EXCEED MACH (*number*);
- e) REPORT YOUR TRACK TO (*or* FROM) (*significant point*);
- f) TRACK (*three digits*) DEGREES [MAGNETIC (*or* TRUE)] TO (*or* FROM) (*significant point*);

- g) CONFIRM ESTABLISHED ON THE CENTRE LINE OF TRACK (*three digits*) DEGREES [MAGNETIC (*or TRUE*)] TO (*or FROM*) (*significant point*) (*or CONFIRM ESTABLISHED ON THE CENTRELINE OF TRACK BETWEEN (significant point) AND (significant point)*);
- *h) ESTABLISHED ON CENTRE LINE TRACK (*three digits*) DEGREES [MAGNETIC (*or TRUE*)] TO (*or FROM*) (*significant point*) (*or ESTABLISHED ON CENTRELINE OF TRACK BETWEEN (significant point) AND (significant point)*);
- i) MAINTAIN TRACK (*three digits*) DEGREES [MAGNETIC (*or TRUE*)] TO (*or FROM*) (*significant point*) (*or MAINTAIN TRACK BETWEEN (significant point) AND (significant point)*) REPORT ESTABLISHED ON THE CENTRE LINE;
- *j) ESTABLISHED ON THE CENTRE LINE.

* Denotes pilot transmission.

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ATTACHMENT B to State letter AN 13/2.5-09/45

**RESPONSE FORM TO BE COMPLETED AND RETURNED TO ICAO TOGETHER
WITH ANY COMMENTS YOU MAY HAVE ON THE PROPOSED AMENDMENTS**

To: The Secretary General
International Civil Aviation Organization
999 University Street
Montreal, Quebec
Canada, H3C 5H7

(State) _____

Please make a checkmark (✓) against one option for each amendment. If you choose options “agreement with comments” or “disagreement with comments”, **please provide your comments on separate sheets.**

	<i>Agreement without comments</i>	<i>Agreement with comments*</i>	<i>Disagreement without comments</i>	<i>Disagreement with comments</i>	<i>No position</i>
Amendment to the <i>Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)</i> .					

*“Agreement with comments” indicates that your State or organization agrees with the intent and overall thrust of the amendment proposal; the comments themselves may include, as necessary, your reservations concerning certain parts of the proposal and/or offer an alternative proposal in this regard.

Signature _____

Date _____